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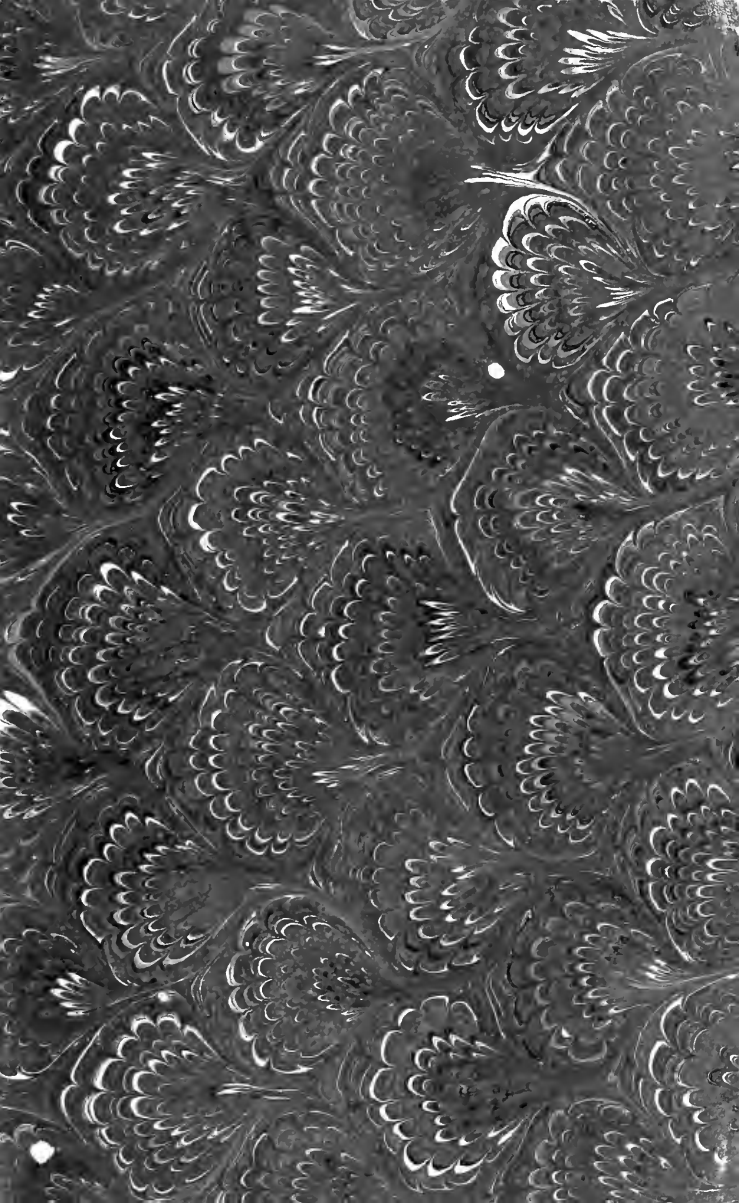
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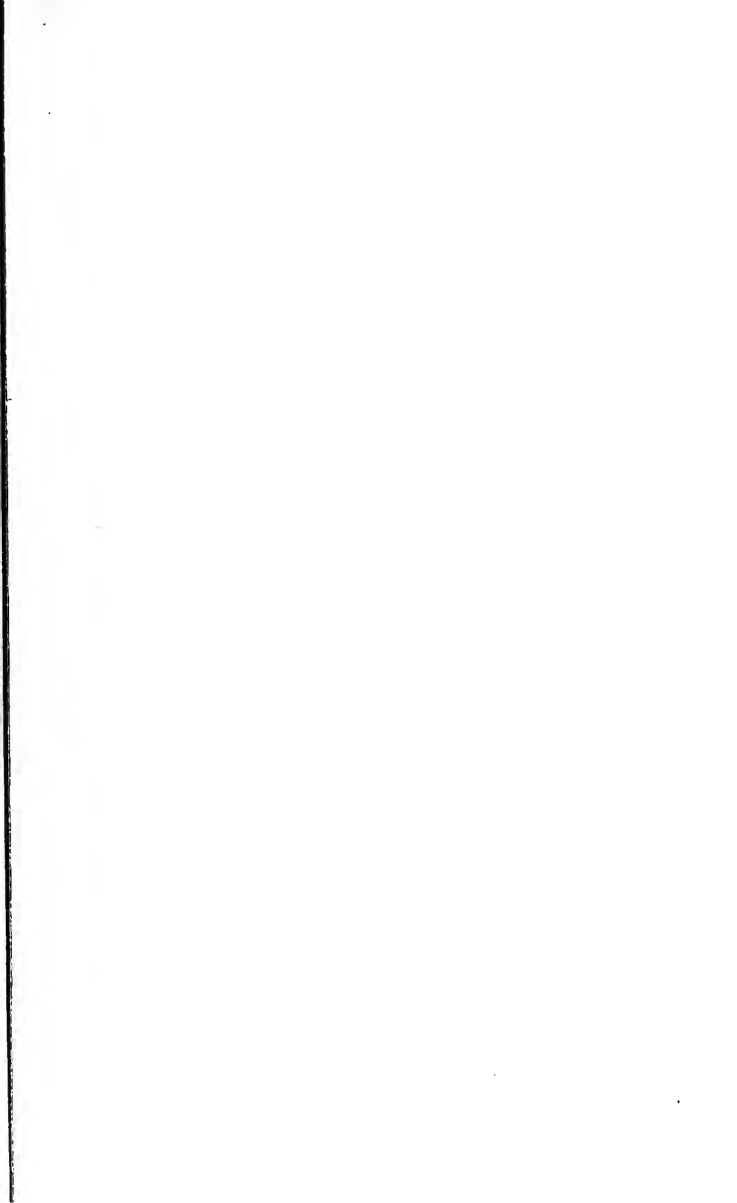
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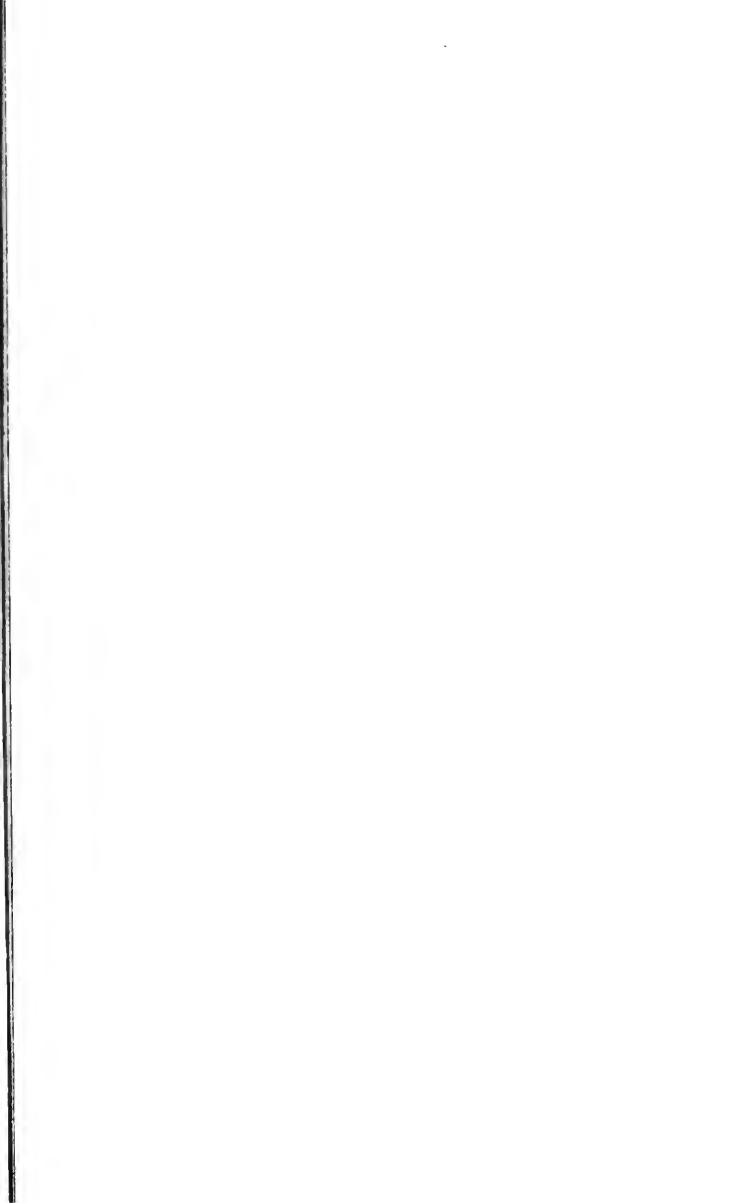
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THE
SIERRA CLUB BULLETIN

Volume II
1897 — 1899



THE SIERRA CLUB
SAN FRANCISCO, CAL.

1899

SIERRA CLUB BULLETIN, VOLUME II.

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LAKE LOUISE

From a photograph by H. G. Peabody, Boston.

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SAN FRANCISCO, JANUARY, 1897.

NO. I.

ON MT. LEFROY, AUGUST 3, 1896.

BY CHARLES SPROULL THOMPSON.

Shortly after dawn, on Monday, August 3, 1896, four men gathered, in eager preparation, upon the platform which surrounds the Canadian Pacific chalet at Lake Louise.* A year before—to the very day, as it chanced,—Prof. Charles E. Fay, Mr. Philip S. Abbot, and the writer had endeavored to reach the as yet untrodden summit of Mt. Lefroy by a couloir which offers the only feasible passage through the cliffs of its northern face. The failure of that endeavor, a failure fraught with possibilities of ultimate success, increased our desire. All winter we had planned and plotted to overcome the difficulties of that mountain. Now, with a less rigid itinerary, with an added comrade,† we made ready for a second, and, as we believed, conclusive, struggle.

The surpassing beauty of the view westward from the platform that morning remains with me. In the foreground, completely filling the lower end of the valley, lay the dark-green waters of Lake Louise, as yet unruffled by the inevitable noonday wind. Four miles away, seemingly but two, beyond rock avalanche, terminal moraine, and

* The valley of Lake Louise lies about two and a half miles southwest from Laggan, a station on the Canadian Pacific Railway, seven miles east of Hector Pass, where the railway crosses from the Atlantic to the Pacific Slope.

† Prof. George T. Little, of Bowdoin College, Brunswick, Maine.

low-lying glacier, the summit range of the Continental Divide swept across the valley, a wall of gray precipice and hanging ice, the snowy battlements of a Canadian Asgard. Before its face, now rising, now falling, now dissolving, strangely stratified clouds floated in curious undulations. The abruptly rising sides of the valley fittingly framed the picture, the quiet waters of the lake doubled and intensified it.

Our route lay up this valley. To the left of the mountain wall, known to us as Mt. Green,* thrusting its imposing mass between the Green and the Mitre Glaciers, stood the goal of our anticipated effort, Mt. Lefroy. Up its eastern face, fronting us,—a snow-corniced precipice, falling four thousand feet to the Mitre Glacier,—it is safe to say that man will never go. The northern face, on the other hand, offered, as we knew, one possible line of ascent. From where we stood, its profile showed a varying slope, inclined at an angle of about thirty-five degrees, steepest in its middle part, ending below in a line of cliffs eight hundred feet high, which overlook the Green Glacier. In this line of cliffs a re-entrant angle held an unseen but well-remembered tongue of snow, rising with ever-increasing gradient to within a comparatively short distance of their summit. Above, two rock chimneys offered a passage, possible but at the time of our former visit quite impracticable, to this upper slope. But the rising sun warned us to hasten. Already its rays touched and glorified the snowy apex of Mt. Green,—a Pythian oracle, read by us as a prophecy of success.

It was a quarter past six as our boat pushed out from the floating wharf; it was a quarter of seven as its keel grounded in the sand of the delta at the head of the lake.

* So named by Mr. S. E. S. Allen, after the Rev. William S. Green, A. C., one of the first mountaineers in this region. Notman's photographer called it Mt. Victoria.

Thence our way held through a last line of forest trees, over rock-strewn and stream-swept flat, over lingering patches of winter snow, up, slowly, steadily up, across lateral moraine and débris-covered glacier, to the uncertainly defined line where snow began to hide the hitherto open crevasses. Here, 7450 feet above sea-level, 1500 feet above the chalet, we paused to put on the rope. We were at the open end of a gigantic amphitheater, walled from left to right by the perpendicular cliffs of Mt. Lefroy and Mt. Green and the hardly less precipitous slopes of Mts. Nichols and Despine. Its floor was the Green Glacier upon which we stood. Not far from us, open to plain view, rose the couloir on Mt. Lefroy of which I have already written. In addition to the difficulties previously encountered, a transverse schrund now completely divided the tongue of snow into approximately equal parts. To pass the schrund, by a difficult traverse across the face of a prominent buttress on the right, was doubtless possible, but to me the thought of such an ascent was far from pleasing. Uninviting as it was, we might ultimately be forced to go that way. On this day, however, our hopes centered in an ascent through the Death Trap.

Quite unseen from the chalet, quite unseen even from where we stood, a curious side passage, hitherto unexplored, led from the amphitheater to the summit of the divide. Hidden in the angle between Lefroy and Green, its major axis parallel with and between the major axes of those mountains, the passage splits the summit range as a wedge splits an oaken log — with the grain. In the early spring the entrance is swept by avalanches from both mountains; in July and August the only danger lies in occasional ice-falls from the hanging glaciers on Mt. Green, a danger easily avoided by keeping under the bare walls of Mt. Lefroy. Doubly impressed by the thunder of these ice-falls, and by the ferocity of the cliffs at the narrow

entrance, an earlier traveler * has given to the lower portion of this passage the name by which we knew it, the "Death Trap." Thither we turned our steps.

A magnificent sight opened southward as we swung rapidly around the corner of the farther buttress of Mt. Lefroy. It came suddenly, almost in the twinkling of an eye—a glacier-filled gorge a mile and a half long, at its widest perhaps three hundred yards, rising in rounded terraces to the summit of the pass, over two thousand feet above. The lower slope, deeply cut between Lefroy and Green, lay in heavy shadow; the higher névé glistened a dazzling white under the undimmed rays of an Alpine Sun. Far above, a curved line separated sky from snow, azure quartered upon argent. For the next three hours—from ten minutes of nine until ten minutes of twelve—four tiny specks moved up this glittering causeway. The ascent was neither difficult nor toilsome. Once, below the debris of an avalanche which had swept far down the narrowing slope, we paused to photograph and lunch. As we ate, a block of ice broke from the overhanging glacier on a cliff near us and fell, pounding into dusty fragments, almost at our feet. Two cameras caught its first down-rushing. Thus fifteen minutes passed; then upward through the avalanche debris and over or around crevasses, one, the last, crossed "on all fours" by means of a snow bridge. Ahead the sharp white line upon the blue sky grew sharper, nearer, then dropped away altogether. The snow broke upon an edge of scree. We looked across the summit of the continental watershed.†

Wonderful, tremendous; not beautiful, save as the sublime always contains elements of beauty; almost overpowering. Three times that day this scene was burned upon

* Mr. S. E. S. Allen, of Philadelphia, Pa., who, in 1894, reached the summit of this pass from the other (or British Columbia) side of the watershed. Our work that day, joined to his, proved it a true pass.

† The barometric altitude was 9850 feet.



MT. LEFROY FROM ABOVE CATARACT PASS.
From photographs by the Canadian Topographical Survey

my visual memory,—three times,—never to be forgotten. Here Mt. Green ended. Below, a great pit, funnel-shaped, holding in its depths a sea-green lake, Oesa, glacier-fed, glacier-hemmed; beyond, a flamelike peak—Mt. Biddle,—and the crescent line of the Ottertails, ended at either horn by the fierce Goodsir and the snowy Vaux; in the far distance, the Selkirks, soft, unreal, cloud-tipped. This at a glance. Then, thrusting themselves upon us by their nearness, the truncated summit of Ringrose, the ragged shoulder of Hungabee, and the white curves of Glacier Dome. At hand, overshadowing us, Lefroy. Never before was such a combination of the far and the near. It was surely true:—"They have not seen the snowy hills of God who have yet to look upon the Rocky Mountains, absolute, stupendous, sublimely grave." *

In this first view, the conquest of Mt. Lefroy seemed assured. That portion of its western slope which lay directly above us was covered by three ice-streams, or, rather, by one ice-stream, broken, more or less continuously, into three parts. Above this ice-covered slope, crowning the mountain, was an almost level palisade of yellowish limestone cliffs, weathered into rude turrets and bastions. The ice reached to the foot of these cliffs, curved to the north, and, sweeping by their right flank, separated it from an inconspicuous mound of gray rock, the probable summit of the mountain. Hidden beneath a thin layer of fresh snow, the surface of this ice inclined at a very considerable, but not prohibitive, angle. Should that surface prove soft and rotten, as from the condition of the ice-slope in the pass there was every reason to hope, we should be on the summit within two hours. Satisfied with the prospect, we turned up a boulder slide, and near its head,† immediately above the pass, we ate a second lunch. I noted

* Gilbert Parker: "Pierre and His People" (Stone & Kimball), p. 141.

† Barometric altitude, 10,100 feet.

curiously that Abbot and Fay were in British Columbia, while Little and I remained in the District of Alberta, Northwest Territory. It was half-past twelve.

The first blow of the ax upon the ice, heavy, dull, resistant, altered our plans, dashed our hopes of easy success, and, little suspected, turned the fortune of the day. No longer an easy, rapid ascent along footholds carelessly taken, kicked in the snow; instead, a long, arduous scramble over intermittent ledges, changing to ice, and toilsome step-cutting only as a last resort. Abbot, as ever, went first; passed to the right over a whitened scree slope, and up a low escarpment* on the southern edge of the largest and most northerly of the three ice-streams, the one, in fact, which led directly to the summit. We had cause to remember that escarpment later in the day. Beyond, moving one at a time, carefully, cautiously, with no thought of things temporal save the glasslike surface beneath our feet, with no knowledge save that the slope opened into the Oesa pit, we cut a way up and over the second ice-stream, dug tooth-and-nail up the treacherous friable limestone of a second ledge, passed across the third ice-stream, climbed another ledge more degraded, more abominable than its predecessor, then moved out upon the ice-dome beneath the crowning cliffs.

Nothing can surpass the supreme exultation of such a moment, the clear, exhilarating atmosphere, the great silence, the virgin peak almost won, the icy dome on which we stood falling into air. The eye, too, swept a broadening horizon. Over the tremendous southern precipice of Green came the snowy top of Huber, prism-pointed; to the northwest, beyond Nichols, lay the unmapped, untraversed ice-field of the Waputchk Mountains, holding in their midst the white cone of Balfour, promising two days hence an easy victory; to the north, rose the

* Barometric altitude, 10,300 feet.

massive bulk of Hector, sulking, as usual, behind a cloud. All the visible mountains were even now beneath us — all save five. Perchance the coming conquest, perchance the quickened heartbeat, enhanced the beauty of this second view. Its memory gives added glory to the first.

Across the pleasure fell a deepening shadow. The day was passing; already it was half-past five. At such an hour our position on the slope became indeed critical. Pushed more and more by the general configuration of the ledges toward that end of the cliffs farthest from the summit, we were now driven either to scale their face or to cut a traverse below them to the main ice-stream; to turn their left flank, a line of perpendicular rock conveniently near us, was manifestly impossible. Apparently, chance favored us. As Abbot touched the base of the cliffs, his face brightened, and with a ring of certainty in his voice, he exclaimed: "There is a good crack here." A minute later we had gathered together upon a tiny bed of scree, perhaps eight feet long, and at greatest six feet wide, the floor of a re-entrant angle.* Jutting into this bed of scree, a narrow knee of rock, some four feet high, offered a first upward step. Above the knee, one to the right, the other to the left of a broad stone face that filled the inner corner of the angle, were two crevices through which a man might press. A plan was quickly formed. In rapid succession Abbot bade us put off the rope. Thus released, dragging both our two ropes tied together behind him, he passed up on the knee, and immediately thence to the right-hand crevice. Little followed. Both, entering the crevice, disappeared behind the rock-face. Fay and I remained upon the scree awaiting the time when, with the aid

* Barometric altitude, 11,300 feet. Capt. Deville, of the Canadian Topographical Survey, informs us that the triangulated height of Mt. Lefroy, subject to correction, is 11,260 feet. We were, I should judge, 200 feet below and 300 feet south of the summit at the time of the accident. Abbot was, of course, considerably higher.

of the rope firmly fastened, we might easily and safely join our comrades on the top of the cliffs. To the men above two ways opened; one, along a narrow ledge about a foot and a half wide, skirting the face of the cliff, summitwards; the other, at right angles to it, up a shallow groove, hopper-shaped, leading directly to the arête. Abbot chose the groove, and, entering it, vanished from Little's view. The rope, dragging behind, followed foot by foot.

Success or failure hung in the balance of the flying moments. Idly leaning against the protruding knee, I watched the mists whirl and eddy around the inaccessible pinnacle of Huber. Fay stood about three paces from me, under the safe protection of an imposing buttress. By leaning a little outward, we both could distinguish the separate boulders of the summit mound. Five, ten, fifteen minutes passed. In the impressive silence came the dull thud of a falling body, faint and rattling at first, heavy and crashing as it came bounding nearer. Crying to Fay that a great stone was coming, I made two steps toward him, turned, saw Abbot pitch through the left-hand crevice, strike upon the top of the knee, turn completely over, and, clearing the scree, plunge headlong down the ice-slope. Some seconds thereafter we saw him lying at the edge of the escarpment, the ropes wound about his body.*

Three hours later we stood beside him. Looking up, I saw again in the gathering twilight those most wonderful peaks of the known Canadian Rockies; above them were the slowly drifting clouds of a coming storm and the depths of an infinite sky. A cool north wind drew gently through the pass—Abbot Pass, in remembrance of him who lay there motionless upon the snow!

*We shall never know how Mr. Abbot chanced to fall. From the nature of the death-wound, a V-shaped fracture of the left parietal and the occipital bones, it is probable that his hand hold gave way, and that he fell backward, receiving the fatal injury in the initial fall.



PHILIP STANLEY ABBOT
1890.

PHILIP STANLEY ABBOT.

BY ROBERT HERRICK.

The man of whom the world was deprived by the fatal accident on Mt. Lefroy, August 3, 1896, was not merely an enthusiastic and skilled mountain-climber to whom a mischance came in a hazardous sport. Although not yet in his twenty-ninth year — scarcely done with the preparatory exercises of manhood,— his powers of mind and spirit had impressed themselves singularly upon a large number of his fellows in every position where he touched them, and had marked him for a strong and distinguished career.

Philip Stanley Abbot was born in Brookline, Mass., September 1, 1867. His parents were both of old New England families from New Hampshire and Maine; among his ancestors were Captain Nathan Hale and Increase Mather. His father's youngest brother, from whom the name Stanley came, left Harvard to take part in the Civil War, and fell at Gettysburg before his classmates had finished their junior year; another uncle, General Henry L. Abbot, Corps of Engineers, U. S. A., filled high positions, both on the staff and in command of volunteer troops, throughout the war, and is to-day one of our most eminent scientific men. This ancestry left its heritage of intellectual force, moral and physical courage, and uprightness with young Abbot.

In 1876, his father, Mr. Edwin Hale Abbot (Harvard, 1855) removed from Cambridge, Mass. to Milwaukee, Wis. There, in the next ten years, Philip completed his studies for admission to Harvard College, entering in 1885 with the class of '89. His preparation for college, which

was directed by his father (at one time instructor at Harvard in Greek and Latin), was singularly thorough. His grasp of Greek was especially remarkable, and his familiarity with Greek authors, even in this early period, made of a necessary task a literary pleasure. In his entrance examinations he took honors in thirteen out of eighteen subjects. Moreover, he had already made himself a fair entomologist, and his collection of butterflies and insects was extensive. Thus, while still a boy, he started the seeds of rational, scientific outdoor interests.

In the summer of 1884 he visited England with his father, and spent some weeks in wandering among the hills of the Lake District, where, in climbing Helvellyn and Skiddaw and Great Gable, he had his first taste of the joys of his favorite recreation. After leading his class during the freshman year—standing higher in percentage on the rank list, according to the system then in use at Harvard, than any other student in the university,—he was compelled to withdraw from college on account of illness. Leaving America in February, 1887, he traveled with the writer successively through Cuba, Mexico, California, and the Pacific Slope to Alaska, returning over the Northern Pacific to the Yellowstone Park and the East. While in Mexico his eyes turned eagerly to the lofty volcanic mountains, and in April, in company with Dr. Parsons of the City of Mexico, and Mr. Barron of St. Louis, he made the fatiguing ascent of Mt. Popocatepetl,* going to the extreme summit of the crater. During his stay in California he made two visits to the Yosemite Valley, from which he explored the neighboring Sierra, finally ascending Mt. Dana, where he deposited his name in the bottle beside that of Dana and a few others. In Alaska the magnificent ice-fields aroused his enthusiasm, and at the Muir and Davidson

* Speaking afterward of his three days' expedition to the summit of Mt. Popocatepetl, Abbot described it as a "grind," requiring endurance in the long tramp over the snow-fields, but without any demand upon skill.

Glaciers he made such short expeditions as the opportunities afforded. On his way East he spent some days in walking and riding through the Yellowstone Park.

Once back in Cambridge, in the autumn of 1887, with restored health and perfect vigor, he devoted himself to all legitimate college interests. Having led one class ('89) in his freshman year, he now entered a second body of four hundred young men ('90), and led his new class in scholarship, taking second-year highest honors in classics. Throughout the remainder of his college course, as well as later at the Law School, where the competition is more severe, he stood among the first two or three each year, it being impossible by the new marking system to determine the relative grade any more closely. His tastes in scholarship were remarkably broad, as well as keen. Aside from the classics, he took high rank in the mathematics, pursued some courses in geology with special interest, and during the last two undergraduate years specialized in history and political economy, to which studies he had plans at one time of devoting his life. More remarkable, when we consider the diversity of his interests, was his proficiency in modern languages. German and French he could use with ease when he entered college, and later, while climbing in the Alps, he spoke German entirely with his guides. He taught himself Italian in order to take Professor Norton's course in Dante. While in Cuba and Mexico on a pleasure tour, he mastered enough Spanish not only to read the language with ease, but also to speak it fluently and correctly. In later years, when he was traveling in Denmark and Norway, he read Ibsen in the original. This range of linguistic power would be creditable for a specialist.

Abbot's interests were not narrowly bookish at any period of his life. While in college, he pulled for a time with his class crews, rowed in the single-scul races, played tennis, and was a skilled hand with the paddle. With

other Harvard students, he did practical work among the poor of Boston, under the supervision of the Associated Charities. He was business manager and editor of the college literary magazine, the *Harvard Monthly*, for two years, and an officer of the two literary societies, the Signet and the O. K. He was also active in social life, keeping himself in touch with a large circle of friends. His keen enjoyment of music and the theater, and his minute familiarity with the masters of our literature, rounded out the accomplishment of this young manhood. A strong, normal physique, and a normal, well-ordered mind, made it possible for him to devote himself successfully to these many diverse interests.)

After graduation, Abbot spent a summer in traveling in Europe. Switzerland, which he now saw for the first time, he determined to revisit for training in mountaineering; he made, also, a pedestrian tour through the mountains of Norway. On his return, he entered the Harvard Law School, from which he graduated three years later, in 1893, with a brilliant record. While in the Law School, he became manager, and finally editor-in-chief, of the *Harvard Law Review*, a publication which Sir Frederick Pollock pronounces to be the best law periodical in English. He was also chosen one of the original directors of the *Harvard Graduates' Magazine*. After taking his degree, he was elected treasurer of the Harvard Law School Association; and it is not too much to say that its brilliant celebration in 1895—when, through Abbot's personal influence, Sir Frederick Pollock crossed the Atlantic solely to attend the anniversary and deliver its oration—was largely due to the arrangements made by this young lawyer. His personal acquaintance with many of the great law-writers of England—Mr. Dicey, Mr. Maitland, Mr. Justice Frye, Mr. Bryce, and others—had stimulated his interests in the scientific aspects of his profession. In 1895 he was ten-

dered a professorship of law in Cornell University, which he felt obliged to decline, and a similar appointment at the University of Wisconsin was offered him only a few days before his death.

The year 1893-94 Abbot spent in the law office of Messrs. Warren and Brandeis, at Boston; from 1894 until his death, he was engaged in the law department of the Wisconsin Central Lines, at Milwaukee, where, in 1895, he was made General Solicitor for the Milwaukee and Lake Winebago Railroad Company, and took special charge of the construction of the Manetowoc line, which was opened only ten days before his death. His duties during these last two years were varied and full of large responsibilities. He had already achieved what was, for so young a man, professional distinction, and won both the confidence and the respect of the Federal and the State Courts of Wisconsin, before which he appeared in important cases.

The summer of 1892 Abbot spent in the Alps, "the university of mountain-climbing," as he aptly describes them. Hitherto his climbing had been but the chance sport of vacations, although he had had experience in widely diversified regions from the Sierra to the mountains of Norway and the White Mountains of New England. In company with Peter Sarbach, a celebrated Swiss guide, he ascended the Matterhorn, the Gabelhorn, the Weisshorn, the Rothhorn, Monte Rosa, and other peaks, thus gaining a valuable training in ice- and snow-fields. Fresh and vivid accounts of these expeditions may be found in two papers which Abbot read before the Appalachian Club,* "An Ascent of the Weisshorn," and "Three Days on the Zinal Grat." In 1892, he made a second visit to the Yellowstone Park, where he had, on his first visit in 1887, passed over Mt. Washburn. During July and August of 1895, in company with other members of the Appalachian Club he

* Printed in *Appalachia* December, 1893, and March, 1894.

visited the Selkirks, a region little explored, on the line of the Canadian Pacific Railroad in British Columbia. Three members of the party—Prof. C. E. Fay, Mr. C. S. Thompson, and Abbot—climbed Mts. Hector, Castor, and Stephens, and made a reconnoissance on Mt. Lefroy.* After a month spent in exploring this new field, Abbot returned to Milwaukee, determined to revisit the Canadian Rockies at the earliest opportunity. Only four parties besides this one of the Appalachian Club have attempted to do systematic mountaineering in this region; many of the commanding peaks have never been reached, and thirty miles north of Laggan extends a stretch of glaciers and snow-fields unexplored by civilized man. This was virgin soil which fired Abbot's enthusiasm for discovery.

At the end of July of the following year, Abbot joined the little party of the Appalachian Club—Prof. Fay and Mr. Thompson, of the former expedition, and Prof. George T. Little, who was unfamiliar with this region—for a new exploration of the Selkirks. In preparation for this expedition, Abbot had learned how to use the barometer and plane-table in making field-maps, in order that he might in some way turn his sport into larger uses. His early-acquired information in geology, botany, and entomology had been extended by his experiences in the mountains. Undoubtedly, had he lived, he would have made some valuable contribution to the literature of mountaineering.

Arriving at Glacier House, July 31st, the party made the ascent of Mt. Rogers in the Selkirks, intending later to climb Mt. Lefroy (where they had been foiled the year before), Mts. Biddle and Sir Donald, and make a thorough exploration of the thirty-five-mile Waputtehk ice-field on the Continental Divide. Having returned to the Canadian

*Accounts of this expedition may be found in *Appalachia* for January, 1896: *The First Ascent of Mt. Hector*, Philip S. Abbot; *Mt. Castor and the Asulkan Ridge*, C. S. Thompson; *Another Story of Mt. Stephen*, Prof. C. E. Fay.

Rockies, they examined the base of Mt. Lefroy on August 1st, for a feasible point of approach, and Monday, August 3d, one year to a day after their first attempt, started from the chalet on Lake Louise for the unconquered summit of Mt. Lefroy.

Few lives of twenty-eight years have been so crowded with undertakings of a high order as Abbot's. There was no side of his many-sided character left neglected or stunted. His broad intellectual interests were genuine; it was not pedantry which made him prefer on a railway journey Homer, or Dante, or Wordsworth, to a novel. Another characteristic equally strong was his love of whatever is human. To old and young, in all conditions of life, he brought something—a sense of power and fineness in living, which entered into their lives.

Of this many-sided character nothing can be said which would adequately describe those more intimate qualities that made him far more than a fine machine of intellect and will. His humor, his objective, eager interest in whatever was really worth effort; his loyalty and effacement of self—these qualities all know who worked with him, either on the mountains or in the office. He seemed to unite an old man's sureness of judgment and a mature man's trained energy of mind with a young man's enthusiasm and liberality. His personal tastes in living were always extremely simple; in the midst of a luxury-loving college world, he chose to live carefully, in order that he might spend generously.

Still more subtle but pervasive was the unstained purity of his life; no human being had anything but good from Philip Abbot. He lived fully and gave abundantly to all, and, though but at the threshold of a career, he had accomplished *character*.

His passion for the mountains was in many respects the expression of his best life. Shortly after his return

from the first expedition to the Selkirks, he wrote to an intimate friend:

"Palmer's old theory, that the nearest approach we can make toward defining the *summum bonum* is to call it 'fullness of life,' explains a great many things to me. Once we came out at seven o'clock upon the crest of a snow mountain, with two thousand feet of rather difficult snow-work before us, when I had expected plain sailing—and the daylight had already begun to fade. At the bottom of the two thousand feet we were, as it proved, still five hours from home; but we could have camped there. But where we were, there was nothing more level than the roof of a house, except the invisible bottom of an occasional huge crevasse, half-masked and half-revealed. I had been feeling lifeless all that day, and we had already had nine hours of work. But the memory of that next hour is one of the keenest and most unmingled pleasures I have carried away—letting oneself go where the way was clear, trusting to heels alone, but keeping the ice-ax ready for the least slip,—twisting to and fro to dodge the crevasses,—planning and carrying out at the same instant,—creeping across the snow-bridges like snails, and going down the plain slopes almost by leaps,—alive to the finger-tips,—is a sensation one can't communicate by words, but you need not try to convince me that it isn't primary. However, this is by the way."

"Fullness of life,"—that is the truest comment that could be made upon Philip Abbot. Fullness of physical life led him to test his steady nerves and vigorous body upon lofty mountains. Fullness of mental life gave keen delight in the problems of his profession, in a Greek chorus, in the intricacies of a new language, in a task, whatever it might be, if it involved intellectual effort. Fullness of imaginative life raised his sports from physical feats to sources of mental and spiritual enjoyment, and filled the hills and the ocean with beauty and mystery. And fullness of affection and faith in human relations made him an ideal son, a strong brother, and a friend who was loyalty itself.

CHICAGO, November 5, 1896.



THE SUMMIT OF M.T. BREWER.

Drawn by Bolton Coit Brown from a sketch by Arthur B. Clark.

WANDERINGS IN THE HIGH SIERRA BETWEEN
MT. KING AND MT. WILLIAMSON.

BY BOLTON COIT BROWN.

PART I.

On the 12th of June, 1896, my wife and I packed our mules, and set out from Sanger for the High Sierra. We spent the first night two miles beyond Centreville, to the delight of the mosquitoes, and the next three at the "Road Camp," four miles from Millwood. We slept one night at Round Meadows; and at Bearskin Meadows,—a delightful place,—remained twenty-four hours. From Burton's Meadows, where we camped three days, we made an expedition, and climbed Finger Rock, so noticeable a feature from Bearskin Meadows. We also gave half a day to a rewarding scramble out north, to the top of the walls that shut in the King's River; and the mountains afford nothing finer than the scenery we enjoyed. Moving deliberately on, we stayed five days at Horse Corral Meadows, and tramped to the summit of the glaciated point, a mile north; and another day ascended the peak south of the Meadow, crossing from it eastward, along the connecting ridge, to Lookout Mountain. The view, especially of the Roaring River basin,* Mt. Brewer, and the Kaweahs, was very grand. That day it rained hard while we were out, and our camp was, naturally, soaked. Again, we trudged to the southeast two or three miles, then northeast and up Grand Lookout, from which the wonderful view of the cañon and beyond into the great Sierra wilderness, with

* See BULLETIN, Vol. I, Plate XXII. Mt. Brewer is just in the center of the picture.

filmy rain and black clouds, and lighter regions picturesquely contrasting, we shall never forget. One might well put in a whole summer hereabouts. In our case, as it was, two weeks slipped away before we reached the cañon.

The evening we arrived it stormed, and John Fox hospitably sheltered us over night in his cabin. The next day we went on, and camped in the upper end of the cañon, where for some days we simply idled about and enjoyed ourselves. One morning the tracks on the ground showed that a bear had paid us a visit. Doubtless through fright at this same bear, the little pack-mule Peggotty ran away from the others and got lost. We trailed her through the jungle to the river's edge, but a diligent search for a mile along the other shore failed to discover where she came out; so we mourned her as drowned. However, she turned up all right afterwards, miles down the river, though how she got there is a mystery to this hour.

The saddle-mule we named Grasshopper, because he always jumped over the bad places in the trail. He seemed to be a right-minded mule, and we liked him. Having planned to see the Charlotta Lake country, we put a pack on him,—Satan, the other pack-mule, being too uncertain, and Peggotty so very small—and I started through the ford on the mare. In midstream, at a sudden cry from Lucy, I looked over my shoulder just in time to see poor Grasshopper swept by the powerful current off the ford into the deeps below. Instantly, I turned his lead-rope once round the saddle-horn and held as hard as I dared, while, with just the top of his pack and his head showing, he wallowed and struggled for his life to keep from being sucked under the big log-jam forty feet below. But the river was high and ran like a millrace, and I had to let his rope go, for fear he would pull my animal and me into the deep water also. He struck the jam just as the mare landed, and I sprang and ran for the logs. Meantime he continued to

make a splendid, and to my vast surprise, a successful fight; by the sheer power of his swimming, he was actually holding his own against the heavy onset of the river. With his submerged pack reeling drunkenly in the current, he looked like a sinking steamer, and for a moment it was an even chance whether or not he would be sucked under, to drown among the black snags beneath the jam. But now, just as he had got his head turned towards the side he started from, he suddenly stopped paddling, when, of course, the current pressed him tight against the face of the jam. There must have been a submerged log holding his legs, for he did not go under, though he made no effort, being momentarily exhausted. I hurried, but before I could get there Lucy, from the other side, had clambered out over the driftwood to him, secured his lead-rope, and by pulling and encouraging him, succeeded in getting him ashore.

And now while we waited for the wet pack to dry, there began a rain which continued for two days. At the end of this time we loaded Peggotty, and, joining forces with Mr. Le Conte's party, which came along just then, we all crossed together without mishap. Two days' travel brought us up to the valley south of Mt. Gardiner, where, ten thousand feet high, we camped in the rain under a lean-to of poplar branches. The second day I climbed Mt. Gardiner.* Lucy did not go. Upon the mountain, I had the pleasure of again meeting Mr. Le Conte and several members of his party.

We moved on, and at 10,700 feet established ourselves on a little promontory beyond Lake Charlotta. It was

* The frontispiece of the last BULLETIN (Vol. I, No. 3,) is a sketch of the northern face of Mt. Gardiner. The name of Mt. Kearsarge under it is a mistake. It is perfectly easy to ascend, except the last spur (the top spike in the sketch), which involves a crawl along a knife-edge, above the precipices there shown, and is not altogether easy. Mr. Le Conte and I, however, rather to our own surprise, succeeded in getting there. Indeed, Mr. Le Conte even carried a camera, set up his tripod on the dizzy pinnacle, and took a series of beautiful views. We were, apparently, the first to make the ascent.

raining; so we built a rude shelter of logs and sticks; and it served us very well for a week. One day we went up the red peak south of the lake (12,000 feet), and practiced mountaineering by following along the jagged crest just above the Cathedral Spires, looking down 4000 feet into Bubb's Cañon. A fine thunder-storm, growling over in the Mt. Williamson region, sent electricity at us. The invisible something passed with tingling prickles and a thin, squeaky, crackling sound through our outstretched finger-tips; and Lucy's front hair streamed out towards the storm, like the pictures in the high-school books on physics, and "buzzed," as she said.

Our provisions having run out, I took Peggy back to the cañon for more, making the trip down in four hours. On the morrow, accompanied by Dr. Wood and Dr. Little of Stanford, I brought back a hundred pounds of groceries. We arrived just at dark, and Lucy, who had been alone two days and a night, was right glad to see us.

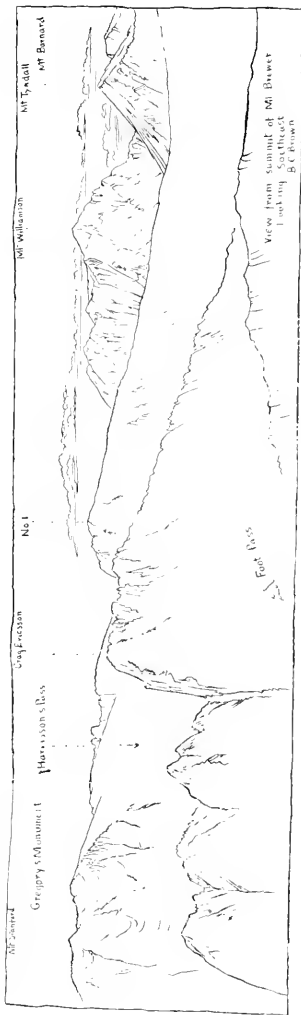
Next day we visited Kearsarge Pass (12,000 feet), and climbed the peak (13,300 feet) immediately north of it. At another time we explored with especial delight a chain of lonely, snowy tarns, hidden in the wild mountains north of Lake Charlotta. We also climbed the small peak (12,000 feet) southeast of the lake. Moving still higher up, we camped at the timber-line above Bullfrog Lake, whence we ascended University Peak (13,990 feet). The next day we went a-fishing, with unlimited success; the biggest trout we caught measured fifteen inches by the tape.

From here we traveled down the Rhoda Creek trail and up the south fork of Bubb's Creek — which suppose we call South Cañon. I think the less this painful name of Bubb's is spread around the mountains, the better. Camping on East Lake in South Cañon, we set out early one morning, and at about eight o'clock had reached the summit of



LOOKING ACROSS EAST LAKE TOWARD MT. BREWER.

From a drawing by Poligon Coal Brown.



Mt. Brewer (13,886 feet).* On the way down we developed a scheme for leaving Peggotty, and going ourselves over the King's-Kern Divide to climb Mt. Williamson. Though Lucy had never before been in the mountains, yet already she had become so hardy and skillful a climber that I hesitated at nothing on her account. After much discussion as to whether we had rations enough, we decided to risk it and start the next morning.

Having baked up all the flour into eatables, we packed it on our backs, and headed up South Cañon. A mile above East Lake the stream forks, and, following the eastern branch, we soon reached a round, beautiful lake. This we named Castilleja Lake, the castilleja blossoms being especially perfect and brilliant upon its shores.† From here we passed directly up the immense gorge to the south, and climbing the wall at its head, found ourselves on the crest of the King's-Kern Divide, looking straight down Kern Cañon.

It had rained all the morning, and was now so misty that not a peak was visible; we, therefore, had to go pretty much by guess. We traveled southeast through an immense labyrinth of lakes, ponds, pools, and puddles, having crossed which we came round the southern end of the last lake against the eastern basin-wall, shaped just like South America, and climbed into a low, rounded saddle beyond. Now we were on the back of a long red spur, which, from the big mountain (No 1. ?) on the north, extends some miles to the south. As the clouds and rain still hid all the peaks, we knew nothing better to do than to follow the

* See Plate IV at the head of this article. The spectator is upon the low eastern ridge that runs from East Lake to the summit, seen at the extreme right in Plate V. The line of ascent may be almost anywhere on this ridge, until you reach the point where it joins the peak. From here there seems to be only one practicable route, which is to climb through a small notch just where the drawing shows two little snowbanks. Once through this notch, you go up easily upon the other side.

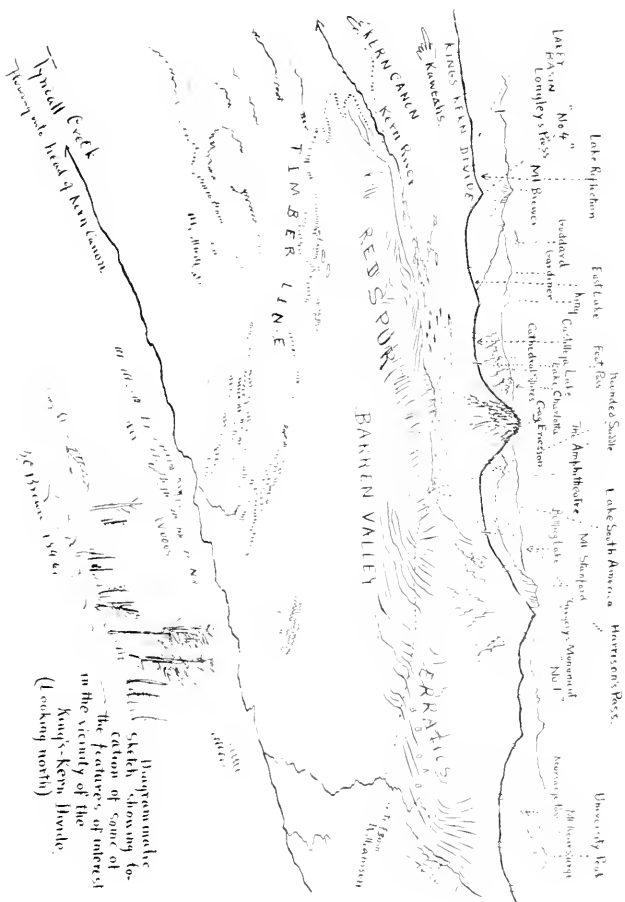
† See BULLETIN, Vol. I, Plate XXV. A photograph by Longley, showing this lake and its setting very well. You are looking northwest.

back of this red spur southward to its termination in a high plateau overlooking the rugged, broken region at the beginning of Kern Cañon.* Descending from the plateau, we tramped eastward along the timber-line, past several small lakes; and at last, as night was approaching, and we had only the vaguest notion of where we were, we prepared to bivouac.

The elevation must have been more than 11,000 feet; and a cold, steady rainstorm was blowing, with no signs of improvement. We had neither blankets nor even coats, and no tools with which to make a hut, and as there were no caves, nor even a protecting ledge, we said nothing at all about the matter. Lucy, bending over to shelter them with her back, handed me dry matches, wherewith, however, I failed to get a fire, because everything was too wet to light. With an ax, or even a big knife, it might have been done; but, as it was, we gave it up. But now, rather than lie all night there on the rocks in the storm, we determined to go back a mile to where we had seen a burning log, probably left by some

* See Plate VII. Sketch of bird's-eye view looking north at the southern side of the King's Kern Divide,—as seen from an imaginary point in space. Longley's photograph, Plate XXVII, furnished some of the data, and my memory the rest. Of course there is here no effort to give correct relative heights or distances, or the forms of the peaks. It is intended merely to convey a general idea of the arrangement of things. This territory is sure to become important to mountaineers; for, barring the discovery of some better pass than is yet known, it is the most natural highway by which trampers can, from camps on East Lake, or Castilleja Lake, easily visit Mt. Williamson and the others. In doing this, either Harrison's Pass or the one we discovered and which I have marked "Foot Pass," may be used. The latter is very much nearer to Castilleja Lake, and not more difficult than the other; also, it is considerably lower. As a mere matter of speed and convenience, I should prefer it. If one had the extra energy and time, however, it would be well worth while to go one way and return the other, for the sake of the scenery. You have to go by "Lake South America," no matter which pass you take.

The best ascent of Crag Ericsson is from the top of Foot Pass; that of Mt. Stanford, from the top of Harrison's Pass. The latter mountain, being a part of the divide between the head-basin of Bubb's Creek and the head-waters of the south fork of Bubb's Creek, might be climbed from the northeast from the Bubb's Creek basin, but it would not be at all convenient. Mt. Stanford and others upon the divide which are not given, approach or reach, according to Mr. Le Conte's latest observations, a height of 14,000 feet. To suggest the scale, I may say that Red Spur is some two or three miles long.



Diagrammatic
Sketch showing to-
cation of some of
the features of interest
in the vicinity of the
Kung's-Kern Divide.
(Looking north)

herder. On the way, however, we came across a big log which looked rather promising, and, to our great joy, we actually fired it up. Then we piled on so much wood that it became a roaring furnace which drove us back and back, and scorched the bag of provisions, and made us so hot and steamy that we were veritable pillars of cloud. But still it rained.*

Darkness came on, and by the time we had finished our lunch, we were so tired that we just lay down among the dripping stones, and, even while the storm beat upon our sun-burned faces, fell asleep. But such slumbers are very intermittent, and we never passed more than a few minutes without waking, and probably hunting out a new place to lie on, or, at least, turning the frozen, wet side to the fire, and the roasted side to the wind and rain.

About thrée, the rain ceased to fall, and not long thereafter, as we munched our breakfast in the dawn, the storm-clouds broke and fled away and hid themselves among the snowy fastnesses of the Kaweahs; and the sunrise came so glorious that we were repaid over and over for all the dreary night.

* See BULLETIN, Vol. I, Plate XXVII. This bivouac was, in this picture, just one inch from the left hand edge and two inches from the lower edge. The title of this plate is in error as to Madary's (or, as it should now be called, Harrison's) Pass, that pass itself being too low to be seen in this picture. The spot which its explanatory foot-note would seem to mean is the one given in Plate VII as Rounded Saddle. In the photograph, the ridge forming the sky-line of the left half of the picture is Red Spur, and its edge connects (though hardly visible here) with the slope of the mountain to the right of the dead tree. This mountain is a southern spur of the higher one to the right, which is practically Mt. Stanford, though the summit is not quite in sight. The peak to the left of the dead tree is not on Red Spur at all, but two or three miles beyond. It is the one we called Crag Ericsson.

To the casual reader these mountain pictures are merely scenery, but to the mountaineer, the one who actually travels in these regions, they are topography of the most valuable kind. It should not be forgotten that these are positively the only public records of these places in existence. They are often more useful than a map; in the first place, because in this case there is no map, and in the second, because it fixes the topography upon the mind through objects which are always in sight,—that is, the peaks and ridges, which are pictured so that you *recognize* the originals when you see them,—instead of fixing it by streams, which are the least conspicuous features there are, which often cannot be seen at all until you come to them, and whose character and “falls,” “fords,” and “blazes” cannot be known until you visit each one in detail.

Leaving the timber, we tramped up for a mile, to get a general outlook, but remained still uncertain where Mt. Williamson was. At last we decided to try climbing the mountain two miles north of us, a splendid, rough peak, apparently about 14,000 feet high.*

Lucy was not at all used up by our twenty-four hours of hardship and exposure, and would not hear of returning to camp without climbing something. But, as it turned out, this mountain, though fine, was not Mt. Williamson; for, when we had gone some hundreds of feet up it, the rugged mass of Williamson appeared, unmistakable, miles away to the southeast. At once abandoning our contemplated ascent, we backed down and hurried across the basin at the head of Tyndall Creek to the wide, high saddle sweeping between Mt. Tyndall and the peak northeast of it. This great saddle, which is a part of the Main Crest, we crossed before eight o'clock; and clambered down into the beautiful and amazingly wild and rough Alpine bowl that fills the triangle between Williamson, Tyndall, and Barnard.

* See BULLETIN, Vol. I, Plate XII. A photograph by A. W. de la C. Carroll, looking northwest from the summit of Williamson, and very interesting topographically. The mountain referred to in the text is one and a half inches from right edge of picture. The edge of the crater-like hollow (one and a half inches up from right-hand corner of plate) is the King's-Kern Divide; the edge just below it (seven-eighths of an inch up from corner) is, however, part of the Main Crest Divide. The actual Main Crest—by which I mean the dividing line of water-flow—crosses the picture about half an inch up from the edge, and runs up the steep slopes on the left, which are the northeast face of Mt. Tyndall. The flat-topped mountain (two and a half inches from right edge), I take to be "No. 1," and Mt. Stanford should be very near and exactly behind it. Mt. Brewer is three and three-quarter inches from right edge, and the little saw-teeth one inch to the left of Brewer are Crag Ericsson. The peak three-eighths of an inch from left edge is, probably "No. 4." Ericsson, Stanford, No. 1, No. 4, and the big mountain one and a half inches from right edge, are on the King's-Kern Divide. The basin that forms the main part of the center of the picture is the head basin of Tyndall Creek, which flows off the picture to the left. We crossed the divide between Crag Ericsson and No. 4, and practically followed up the Tyndall Creek basin and came up over the foreground of the picture, towards the spectator. This place is much bigger than it looks, and is the "wide, high, sweeping saddle between Mt. Tyndall and the peak northeast of it," referred to in the text. Just at the edge of the picture to the right, the smooth saddle breaks away; and this is the northern rim of the big bowl referred to. In coming out we came up over the larger snow-bank at the left. Plate XI (a continuation, to the left, of the same view) shows the western wall of the bowl—the eastern face of Mt. Tyndall. That cliff is probably two thousand feet high.

Mt. Williamson, which is not on the Main Crest, but to the east of it, towered in the morning light, dark, massive, and bristling—a stupendous pile and a most impressive sight. Its shape may be likened to that of a house, with gables east and west. Having crossed the bowl, we attacked the mountain by climbing up two or three hundred feet over a small, reddish slide at its extreme north-western angle. Thence we followed a previously selected diagonal upwards across the western end of the house, and gained a small notch near the eaves on the southwestern corner.

The climb to this perch, though not especially dangerous, was exceedingly rough, and very impressive because of the vast heights above, that seemed almost to overhang us, and the vast depths below, that we seemed almost to overhang. Looking through the notch, we saw the southern face of the peak—a wilderness of vertical crags and gullies, seemingly impassable. Yet the hope of finding there a line of ascent carried us out among them, where, after some really ticklish cliff work, we got upon the lowest seat of a bottomless amphitheatre with very high and steep sides. Wallowing up to the top of a big snow-bank, we managed to squirm from it on to the next ledge; thence we edged up a crack to the one above, whose smooth slope was ascended by sitting down and shoving ourselves up backwards with the palms of our hands. The next step we reached by cross-bracing ourselves against the sides of a vertical crack; everything the gymnasium ever taught us, and several things it neglected, now came in play. Eventually, up the bottom of a narrow, steep *chûte*, over patches of snow and ice, with plenty of all-over climbing, we got up the highest and steepest part of the southern wall of the peak—through the eaves, as it were,—and upon the more moderate slope of the roof. From here to

the ridge-pole, and thence westward to the summit at its end, was easy.*

By noon we had conquered our mountain and stood 14,448 feet above sea-level. Naturally, the view is something to be experienced rather than described. Everything in that part of the world is in sight. Gazing off into the immense pale distances of mountain and plain, where it seemed as if one saw away into Colorado to the east and Mexico to the south, we marveled at that magic of atmosphere and light and distance which could transform mere flat earth and barren mountain into these enchanting visions of ravishing beauty. Flocks of gentle clouds floated in white multitudes beneath us, while their violet shadows dappled the mountain ranges and the tawny desert. Owens Valley, hardly five miles away, lay ten thousand feet below. Scores of miles to the south, that great inland sea, Owens Lake, stretched its vast surface of heavenly blue; and, wide as it is, so great was our height, that whole topographies of mountain ranges and wide plains beyond it lay piled up into the sky in level layers, and lost themselves along the immensely remote and hazy horizon. About us, and visibly beneath, stood the compact host of silent, beautiful, restful mountains; snow-spotted, cloud-shadowed, sun-lighted, changing always, yet each in his place changeless since the dawn of primeval time.

The summit, if I remember rightly, held records of three ascents, of which one was made fifteen years ago. I think they were all from the plains of Inyo County to the east. Perhaps we were the first to reach it from the west. On the return we fully monumented our route as far as the

* Clarence King, in his much-exaggerated account of this country, says that Mt. Williamson is an "inaccessible bundle of needles." But, having gone over some of the country he describes, I am strongly inclined to suspect that there was a general tendency with Mr. King to put down the things he did not himself do as impossible. His book is very far from giving a true impression of the region from Brewer to Tyndall.

notch in the southwestern corner; and beyond this left a few marks down along the western face. Among such a multitude of crags and crannies there may be many ways of possible ascent; but from all that we saw, both going and returning, they would seem to be rather scarce, and not easy to find in a limited time. Two friends of ours, who attempted it a few days later from the same side, failed to make the summit through going up a *chôte*, the head of which turned out to be a *cul-de-sac* from which they could not climb out.

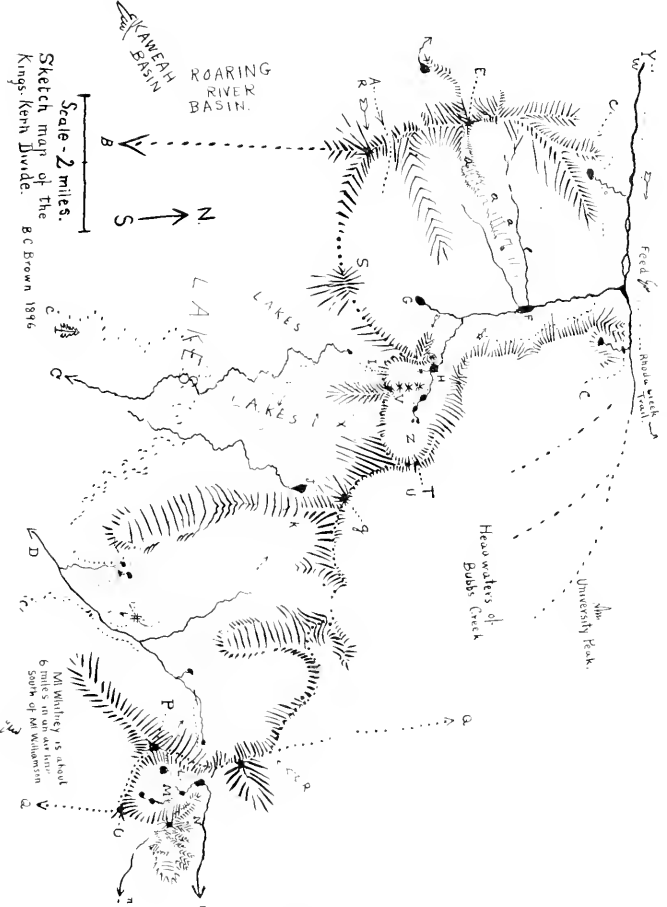
Reaching the bottom of the bowl in the middle of the afternoon, we crossed it and climbed out over a steep snow-field close under the awful precipices of Tyndall's eastern face. It would be easy to ascend Mt. Tyndall by its northern angle. We talked, in a joking way, of doing it then and there as we passed; and Lucy declared her ability to compass it and get back to timber before dark. Probably we could have done it, ascending in two hours and descending in one; but we refrained. Our labors were beginning to tell on us, our shoes were worn to tattered wrecks, and, besides, we feared the storm had raised East Lake so high as to cover the grass where Peggotty was tied. Therefore, although it had taken us a day to get from camp to the point where we now were, we determined to try to return that night. And we did it,—though we had to run part of the way. We tried hard, but failed to make the pass over the divide by sunset, and, arriving just at nightfall, had to go rattling down its steep northern gullies, all wet and slippery, in the dark. Thence, through a mile or two of the usual glacial piles of huge blocks, relieved by an occasional pallid snow-field, we descended without accident; and, leaving Castilleja Lake on our left, worked through the granite ledges into the dark pine-woods below. Down through these, by our sense of general direction, we stumbled and slid; and finally, at about ten o'clock,

reached the camp at East Lake. That day we tramped and climbed, at speed, for fifteen hours, during the last six or seven of which we had not paused for two consecutive minutes. The lake had risen two feet, and quite covered Peggotty's poor little grass; but some wandering mountaineer had come to her rescue and tethered her on the feed above. Next day we returned to King's River Cañon, where we found most of our stock all right; but Satan had run away again—fallen in love with a herder's outfit, and followed it over into the Middle Fork basin, as we afterwards heard.

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Key to Sketch-Map.

- A.—Tomley's Pass
- B.—Great Western Bridge.
- C.—Head of Kalm River.
- D.—Tyndall Creek.
- E.—Mt. Brewer.
- F.—Fast Lake.
- G.—Lake Reflection.
- H.—Castella Lake
- I.—Foot Pass.
- J.—Lake South America.
- K.—Pass over Red Spur (animals).
- L.—Wide pass over main crest (no animals).
- M.—The "Lead".
- N.—Mt. Williamson.
- O.—Mt. Barnard.
- P.—Mt. Tyndall.
- qq.—Main crest of the Sierra for Kings-Kern Divide.
- S.—"No. 4."
- T.—Mt. Stanford.
- V.—Gregory's Monument
- W.—Craig Emerson.
- X.—Bubb's Creek.
- Y.—Harrison's Pass.
- Z.—Our route to Williamson and return.
- aa.—The "Amphitheatric."
- bb.—Our highway (see text).
- cc.—Timber line.
- Re.—"No. 1."
- m.—Shepard Creek.
- n.—North fork of Tioga's Creek.





MOUNTAIN TRIPS;

WHAT TO TAKE, AND HOW TO TAKE IT.

BY HOWARD LONGLEY.

These are questions of grave concern to every one who contemplates a journey into the heart of the Sierra, far removed from any source of supply or assistance. Not novices alone, but the more experienced as well, unless they have recorded the teachings of previous trips, find it difficult to determine just what, and how much, to take upon a trip of a given length; and frequently discover, in the recesses of the forest, that the article they then most need was forgotten and left at home. Not only that, but the trained mountaineer has learned many expedients which more recent recruits would be glad to know; but there is very little published information available. Such thoughts prompt the writing of this article. Not wishing to be considered an authority, we still hope to be of some assistance to those younger in mountaineering than ourselves; and, better still, to arouse an interest in the matter which will draw out, in future numbers of the BULLETIN, the ideas of those old Sierra veterans who can speak to the advantage of all.

WHAT TO TAKE.

FOOD.—The following is a list of provisions taken by our party last summer, the quantity of which will be found abundant for three men for two weeks. While it is believed no essentials are overlooked, individual tastes will readily suggest changes. It is advisable to take only the best quality of goods. *Meats:* 9½ lbs. ham, \$1.25; ½ lb.

deviled ham, 15c.; 4 lbs. corned beef, 45c.; 1½ lbs. (6 cans) sardines, 85c.; 2 lbs. salt pork, 20c. *Vegetables:* 2 lbs. rice, 10c.; 6 lbs. (2 cans) tomatoes, 20c.; 2 lbs. (1 pkg.) germea, 20c.; 2 lbs. (1 pkg.) prepared buckwheat, 20c.; 2 lbs. (1 can) corn, 15c.; 3 lbs. split peas, 20c.; 1½ lbs. Lima beans, dried, 6c.; 20 lbs. potatoes, 40c.; 8 lbs. onions, 15c. *Fruit:* 2 lbs. prunes, 25c.; 3½ lbs. dried fruits, 40c.; 30 lbs. (10 cans) Flickinger's canned fruits, \$3.00; 3 lbs. raisins, 30c.; 3 lbs. (1 doz.) lemons, 25c. *Miscellaneous:* 2 lbs. salt, 5c.; pepper, 10c.; 12 lbs. sugar, 75c.; 9 lbs. cottolene, 90c.; 3 lbs. butter, 65c.; 11 lbs. (11 cans) Highland evaporated cream, \$1.65; ¾ lb. Van Houten's cocoa, 75c.; 4 lbs. (2 pint bottles) gherkins, 70c.; 4 lbs. (1 qt.) olives, 20c.; 3 lbs. soda crackers, 25c.; 13 lbs. flour, 30c.; ½ lb. baking powder, 25c.; 6 lbs. (2 doz.) eggs, 40c.; ¼ lb. matches, 5c.; can-opener, 10c. Total weight, 172 pounds; total cost, \$15.86.

It will be noted both dried and canned fruits and vegetables are enumerated. The former require considerable preliminary soaking, and a longer time to cook; and, while traveling, the advantage of having some canned goods, which can be prepared in a few minutes, more than offsets the objection to their greater weight. Besides, they afford an agreeable variety. We took cocoa, rather than coffee, because it is more strengthening and less bulky. We tested several brands of condensed milk, but found the Highland cream more palatable, although a greater number of cans is required. Rice and germea, with this cream, were popular dishes. So were the dried peas and lima beans, cooked with the pickled pork. In making up one's list, it should be remembered that rice, germea, buckwheat, etc., are equal to several times their weight in flour. The first week's lunches exhausted the crackers, the last of them being much broken. Cottolene was used instead of lard, because it keeps better, and is not melted as readily by hot

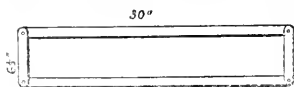
weather. Two small buckets of it are more convenient than one large one. We got fresh butter the day before starting, packed it in a tin can with a large-sized screw top, and it was as palatable the last day of the trip as the first. Five or six dozen eggs, packed in bran in a small box, were taken as an experiment. They kept fresh for over a week, but by the ninth day were spoiled by the severe jolting. The lemons served to disguise the unpleasant flavor of water from meadows where sheep had pastured; and the olives went with the first week. Raisins are nourishing, and a small pocketful will stave off hunger when on forced marches.

DISHES.—A knife, fork, and spoon apiece, of course; — steel knives, well sharpened. Also a plate apiece, and two or three extra ones to serve on. Cups are also necessary; and, if you want to avoid burnt fingers, they should have handles. Two saucers apiece will prove acceptable. The above articles can all be had either of tin, granite ware, or aluminum; but crockery should not be taken. We got, of granite ware, enameled white, and hardly distinguishable from porcelain, a cup and deep saucer for 45 cents, and a mush-bowl for 20 cents. The three bowls and three saucers which we took fitted into each other so as to take but little more room than one bowl.

It is also desirable to have two cans made, costing about 20 cents each, and holding about a quart, and having large openings with screw-tops. These carry safely on the road unused portions of cooked food, which would otherwise have to be thrown away, or else carried in open cans, with much risk of loss and of damage to everything in their neighborhood.

COOKING UTENSILS.—Of these, we found the following articles sufficient: 2 or 3 large spoons for cooking; 1 pancake turner; 2 sheet-iron 8-inch frying-pans, costing 40 cents each; 2 8-inch granite ware stew-pans, costing the

same; and 2 buckets of heavy tin, made to order for about \$1.50. The smaller was 9 inches in diameter and $8\frac{3}{4}$ inches in height, having a lid (with ring) and a wire handle of the same diameter as the bucket. The other was $10\frac{1}{2}$ inches in diameter, 10 inches in height, and had a lid (with ring), a handle, and 2 rings riveted on the bucket near the bottom at points midway between the ends of the handle. There should be no solder used in making these buckets, or they will fall apart when subjected to the heat of the camp-fire. As the smaller bucket was placed in the larger, and its outside therefore had to be kept clean, it was never allowed on the fire, but was used exclusively for carrying and keeping on hand fresh water, while the larger one was used for heating water and general cooking purposes. We avoided many of the discomforts of cooking food over an open fire by having a hollow handle made of tin, one foot long, and flattened at one end so as to readily receive say three inches of the handle of the frying- or stew-pan. With this little implement, costing ten cents, always cool in our hand, we could stand, pleasantly removed from the heat and smoke, lift off a pan, flop a cake, or stir the food, and return the dish to the stove. The stove, by the way, was made of band iron, $\frac{1}{2}$ inch thick by one inch wide, as shown in the



following cut, and was riveted so as to permit movement and the bringing together of the two

side-pieces. The ends rest on flat stones, about six inches above the ground; and by a little adjustment, it can easily be made level. It holds three cooking utensils at once, is very convenient, costs about \$1.00, and weighs five pounds.

MISCELLANEOUS SUPPLIES.—Plenty of strong cord, some baling wire, a spool of fine copper wire, a pair of combined nippers and pincers, a coarse file, a punch and a package

of assorted rivets, a handful of various-sized nails and screws, some leather straps and thongs, two or three snaps, extra boot-laces, two or three iron rings, a paper of hob-nails, a paper of tacks—both plain and double-pointed. All these were put in one canvas bag, with a draw-string top; and its contents, while weighing only five and a half pounds, successfully met all emergencies and made many repairs. The cost of this assortment was about \$2.75. An ax, well ground, should be taken along; and a light hatchet in addition is often found useful. A pick and short-handled shovel are not necessary, but sometimes convenient. At least one canteen, holding two quarts, should be taken; and it should always be kept full. The inexperienced frequently suffer from thirst as a result of being over-confident of finding water along the way. A compass should be carried; and an aneroid barometer, if one cares to know the extent of his ups and downs on the trip. We fished, and so each took a rod, lines, assorted flies and leaders; and we improvised creels out of sections of gunny-sack. Hunters, of course, will want to take everything necessary in their line.

In addition to the few articles necessary for strictly personal use, we took three dish-cloths, three kitchen towels, toilet and Ivory soap, and a toilet case for common use, containing scissors, tooth-powder, mirror, pins, safety-pins, assorted needles, strong thread—black and white,—and one-half dozen extra buttons. We also considered necessary a note-book, pencils, playing cards, Sierra Club map, and two or three books; and the following medicines: Arnica, court-plaster, medicine for colds, iodine in ammonia for snake bites, Squibb's mixture for stomach troubles, a reliable poison-oak remedy, and a box of vaseline.

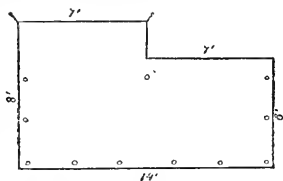
CLOTHING.—Each person should take one suit of extra underclothing, two extra outside shirts, strong and preferably of dark color, plenty of socks and handkerchiefs, a

pair of heavy gauntlet gloves, either a heavy coat or a sweater, and overalls to wear in the mountains, or else an extra pair of pantaloons to go home in. These can best be carried in a canvas bag, wrapped in the bed when traveling. Gloves, shirts, and pantaloons should be heavy and strong, for they will be tried severely. A soft felt hat with rather broad brim is the proper thing. Never start with boots or shoes that are not a perfectly comfortable fit. A person who has trodden many weary miles upon blisters larger than a quarter-dollar, made by poorly fitting shoes, will not overlook this precaution again. With proper hunting boots one can ford streams not deeper than the height of the boot without getting the feet wet, and in going down gravelly slides grit cannot enter to torment, while the heavy leather is almost proof against rattlesnakes. Those who find boots too tiresome wear heavy shoes and leggings; but, for the reasons above given, I would sooner use boots, and, if necessary, take a light pair of shoes for camp. Which-ever kind is used, should be as strong as possible, with thick soles, and hobnailed.

BEDDING.—Two of us used one sleeping-bag, made by laying down a double blanket (not cut apart), opened. Upon one-half of it two sheets of canton flannel were laid, with the soft sides together, then two quilts upon that, and upon this was turned back the other half of the blanket. The edges of these various articles were then strongly sewed together across the bottom, all the way up one side, and two-thirds of the way up the other. The covers being fastened together, one can't pull or toss them off during sleep, or gradually work out the bottom when upon a slope; and the edges being held tightly together by the sewing, the cold wind cannot penetrate. The advantages of a double bed over two single ones are that you have the warmth of the other body, there is greater liberty of movement, and the clothing is not drawn down upon you as much as in a nar-

rower bag. One side of this bed is thicker than the other, and that side is placed uppermost which best corresponds with the temperature of the atmosphere. If this amount of bedding is not sufficiently soft, a feather-bed effect can be produced by placing under it a sufficient quantity of small pine or fir boughs. Camping-cots are no softer, while they are cumbersome to carry, and, the body being suspended, the cold air circulates underneath, and makes it hard to keep warm. Mr. T. S. Solomons informs the writer he finds most convenient a quilt made of eider-down, doubled over and fastened across one end and up the open side, and this placed in a canvas bag. Complete for one, this weighs six pounds. He claims there is much less weight and bulk for the same amount of warmth than where cotton is employed; and, if the bedding has to be purchased anyhow, perhaps the expense is not much greater.

In addition to the bed above described, we had a piece of canvas, made as shown in the accompanying cut, and used as follows: The bed is laid upon the left-hand half, with its head toward the flap above. When desired, the other half is drawn over the bed. Otherwise, it affords a clean place on which to deposit one's clothing, or to dress. When the weather is very cold, or there is much wind, or a storm of rain or snow, the open side of the bed can be laid to the middle of the canvas, so that this last, when folded over, closes the opening; the cloth can be fastened together by the eyelets at the bottom and sides; one can then crawl in, pull the flap down over his head, secure it there by hooking the snaps at its corners into the rings, and there he is, as warm and



protected as one possibly can be in wild weather. During the day the bed is folded up in the canvas, which protects it when traveling. Such a bed for two weighs about 18 pounds, and the cloth 8 pounds more.

Having now considered what to take, the next subject requiring attention is:

HOW TO TAKE IT.

ANIMALS.—If the journey is to be upon good roads or well-made trails, with the country not too rugged, mountain-bred horses are desirable. If the way is uncertain, over rough country, and the opportunities for feed unknown, they should be left at home. Under no circumstances should horses not thoroughly used to mountain travel be taken. As between the small breed of mountain-trained mules and burros, there is not so much choice, but the odds are in favor of the small mule. He can carry more and walk faster than a burro, but his feet may not stand the same amount of hard usage; nor is he usually as docile. If one indulges in the luxury of an assistant to attend to the animals, or if one is not used to considerable physical exertion, it may be desirable to take saddle-animals. But if one must have the care of them himself, or intends to explore unknown regions, they should be dispensed with. The average mountaineer considers them a useless incumbrance. As to the number of animals necessary, it has been our experience that good and continued service cannot be had from burros, traveling in rough mountainous country, when loaded with much more than 100 pounds each, although they are occasionally started on a trip with as much as 150 pounds. Everything mentioned in this article, including boxes to pack in, will weigh less than 350 pounds. We had three good burros, traveled almost constantly, and brought them back in first-class condition.

SADDLES, BRIDLES, AND PACK-ROPE.—Never start until the pack-saddles are in good condition. They should have both front and back cinches, breast-straps and breeching; and will cost, new, with a pack-cinch, about \$5.00. With such a saddle, a properly packed outfit will need very little attention, even on the roughest trails; while with a poor one, frequent trouble is almost certain. An extra gunny-sack, folded, can be used to replace a broken cinch, if necessary. Saddle-blankets should be large and soft, and may be made of carpet and gunny-sacks, if regular ones are not at hand. No bridles are necessary for pack-mules or burros; nor is even a halter essential. A lead-rope, tied around the neck, will usually answer; while a half-hitch of the rope around his nose will bring a stubborn one to time. The first few nights out the animals should be staked. After they get away from their usual haunts, if food is scattering, it might be advisable to turn them loose. In such case, a bell attached to the one found to be the leader, will frequently save much time in searching for them among the brush. Our pack-ropes were of $5\frac{1}{8}$ -inch cotton rope, each about 35 feet long, with a snap on one end, and cost about 50 cents apiece. The length was ample, either for packing or staking the animals out at night. Cotton rope is softer and more pliable than manilla; but if you tie a pack with it when wet, upon drying it stretches so as to necessitate readjustment. Moreover, it probably wears out more quickly, and cannot be relied upon to survive more than a month of continuous service. In addition to a pack-rope for each animal, an abundance of smaller rope should be taken for lead-ropes, and various purposes. Be sure that one end of the pack-cinch has a ring, and the other a large hook. Snap the rope into the ring, and then it need only be looped over the hook at the other end, instead of being drawn through a ring.

SADDLE-BAGS.—They should be box-shaped, 18 inches

long by 16 inches deep and 8 inches wide, made of heavy canvas, strongly sewed. There should be two loops of rope about a foot long, securely fastened to one upper edge of each, on the side next the saddle, and about five inches from the ends; and a ring about $1\frac{1}{2}$ inches in diameter should be strongly attached to the middle of the opposite, or outer, edge. One of each pair of these "cuyacks" should have three feet of small rope permanently tied to its ring. Saddle-bags of this size are ample for use upon a burro or small mule, and cost about \$3.50 a pair. They cannot be made too strong to withstand the rough usage to which they will be subjected.

BOXES.—If boxes are used for packing, a convenient size is twenty inches long, nine inches wide, and fourteen inches deep. The ends and the side that comes next the animal should be at least three-quarters of an inch thick, and the rest may be of one-half-inch stuff; all of light but tough wood, dressed and put together with screws. The edges and lower corners should be rounded; and they would be still more serviceable if the edges were bound with strips of thin sheet iron, like trunks. The lid should be on top, hinged, and made of one-half-inch stuff with outside cleats to strengthen it. Loops of rope should be fastened on the thicker side by means of holes bored near the top, and a ring should be fastened on the other side by a strap riveted on. Such boxes will probably cost fifty cents to one dollar apiece, and weigh fifteen pounds.

SADDLE-BAGS VERSUS BOXES.—While many packers turn up their noses at the use of boxes for packing, others are as enthusiastically in favor of them. Boxes are heavier, it is true, and their size does not decrease as their contents lessen,—which are disadvantages. The objection that they chafe the animal does not hold good if the boxes are not too large, if the corners are rounded, and if a sufficient saddle-blanket is used. A little more skill may be required

to adjust boxes properly upon an animal; but when it is accomplished, the pack is there to stay. When the rope is tightened around saddle-bags, the pressure upon their contents is great, and the breakables are in danger. This pressure upon only certain points under the rope, causes a readjustment of the contents of the bag as we jolt along the road; consequently the rope is slackened, and the pack is more liable to slip. With boxes, when the rope is once tightened, it necessarily remains at the same tension; and the pack, if properly balanced, must ride as safely at the end of the day as at the outset. Articles can be disposed of in boxes, and taken from them with greater neatness and convenience than in saddle-bags; while during a rain-storm, whether on the road or in camp, your provisions are thoroughly protected. If you are fording a stream, and the animal accidentally or of necessity gets deep enough in the water to dip the pack for a moment or two, not enough water will enter the box to damage its contents, while a canvas pack soon becomes water-logged. The box, closed on all sides, keeps its contents cleaner than the open-topped bag. When in camp, provisions in saddle-bags are not safe from the inquisitive and ever-hungry burro or other animals, while in boxes they are. A box on its side serves as a seat, and another, upright, constitutes a solid and level table. The under-side of the lid forms an excellent bread-board. A wire passed through two gimlet-holes near the top of the rear end of one of the boxes enables the hatchet to be securely fastened, where it is ready for instant use, and not in the way nor necessary to be detached when unpacking. The way the boxes rest on the animal always throws the outer edges higher than the inside, and the stove, fishing-rod, and other articles which are similarly fastened to the tops of the boxes are therefore well protected, not only by the higher portions of the boxes themselves, but, in addition, by the horns of the saddle; while, if bedding is to

be placed above them, they are equally well protected from breakage through pressure, by reason of the flat and solid box on which they rest. One can toss the sack of cooking utensils and the canteen between the horns of the saddle which does not carry the bedding, and by reason of the slope of the boxes they will ride safely without being tied. When saddle-bags are used, after they and the bedding are adjusted and roped up, inclination, and even necessity, leads one to tie the various loose articles separately to different portions of the pack, and each has to be separately removed before the pack can be taken off. With boxes, if the pack should slip, all that is necessary is to throw aside the canteen and sack, loosen the pack-rope, and lift off the two boxes with their appurtenances still attached — only four articles to remove, and but two of them fastened, — thus saving considerable time, trouble and sometimes danger. We believe the advantages here enumerated far more than offset the objections to boxes for packing; and, using both methods at the same time, we have become strong advocates of the use of boxes.

DISPOSAL OF PROVISIONS.—Canned goods are always ready to be packed, while potatoes, etc., need but a gunny-sack. With things ordinarily received in paper from the grocer the case is different. Last year we made sacks for such articles out of closely woven muslin, with draw-strings; and a Dennison tag attached to each conveniently designated its contents. Of those who pack in boxes and make frequent trips, a few of the more fastidious have square tins made to fit the boxes, of proper size and suitably labeled, with large screw-tops, in which such articles are kept absolutely safe from the weather, rough usage, dust, and purloining animals.

PACKING.

All our knives, forks, teaspoons, cups, saucers, bowls, can-opener, and the two cans of left-over food were con-

tained in the smaller bucket. That was placed in the large one, and six pie-plates laid on top. Then the lid of the large bucket was put on, string or baling wire run through the ring of the lid and the other rings near the bottom of the bucket and tied; and we had, in one package, all the dishes and some of the food needed for lunch. These things weighed, with the cans empty, twelve pounds. The cooking utensils were thrown in a sack, and the opening tied. These weighed seven pounds. As one's outfit receives a great many handlings upon a trip, it is desirable to have as few packages as possible. Consequently, arrange to have everything go in "cuyacks," or boxes that can be put there. The two for each animal should be of as nearly the same weight as possible. Five pounds difference, with constant jolting hour after hour, will frequently cause a pack to turn. Where the weight cannot be so adjusted, by swinging the heavier box a little higher on the animal than the other, the equilibrium can be maintained.

If there are several animals, saddle them all first, and do not give the cinches their final tightening until just before putting on the pack. This means a less length of discomfort for some of the animals, and consequently a greater capacity for work. Separate the cinches pretty well, so that the swell of the belly will be between and hold them apart, and tie them with a piece of string at that distance, so they will not spread farther and chafe the animal's legs. Tighten the rear girth last, and uncinch it first, or you may have trouble, especially with a mule. The breeching and breaststraps should be no looser than is necessary to prevent rubbing from the movement of the animal. When the final cinching is being done, one's conscience is always eased by remembering that animals invariably distend their abdomens considerably beyond normal size during that operation, and the severe tightening necessary does not, in fact, give the amount of pressure at first apparent, and that a

hundred-pound pack causes the saddle to settle more closely to the animal, and decreases the strain in that way.

Having nicely balanced each pair of bags or boxes, suspend them upon the animal by hooking their loops over the two horns of the saddle which are on the opposite side. The length of the loops can be adjusted so as to obtain a properly-balanced pack, either by tying a knot in the loop, wrapping it twice around the horn, or twisting it a number of times before placing it over the horn, as may be necessary. The pack should not be too high, because the higher it is built above the animal the more top-heavy it will become, and the greater the liability to slip over. On the other hand, it should never extend below the animal's abdomen. After the loads are properly placed, run the loose end of the rope which is tied to the ring of one of the "cuyacks," or boxes, through the ring of the one upon the other side, and draw the rope tight, so that, while the bags are not pulled out, a considerable portion of their weight is sustained by this rope, and prevented from pressing against the animal's sides; and then fasten the rope by a loop, rather than by a hard knot. Bedding should be protected by canvas from dust and the limbs of trees, and, when folded, its length should be across the animal. When "cuyacks" are used, it is advisable to have a large piece of heavy cloth, preferably waterproof, to throw over the pack just before putting on the cinch-rope, to protect its contents from dust and rain. When cinching, watch that the bedding or the pack itself does n't get pulled lopsided.

If you cannot make a diamond hitch, take along Mr. Le Conte's lucid description of it, contained in the *SIERRA CLUB BULLETIN*, Vol. I, No. 8, and with its aid you can learn in a few minutes. If you use it upon one trip, you will never try another. Using boxes and the diamond hitch, when we stopped at noon we could unpack and unsaddle the animals in ten minutes, let them feed and rest

for three-quarters of an hour, pack up in twenty minutes or half an hour, and be off again. This stop at noon was not only good treatment of ourselves, but kindness to the burros, and wisdom as well. After a heavy pack has been thumping up and down upon an animal's back for three or four hours, with a tight cinch cramping his "in'ards," an hour's relief is not only considerate, but enables him to put in the balance of the day to much better effect than if the burden and travel were continuous.

A good many of the things mentioned in this article may be considered unnecessary by the hardy mountaineer, especially as regards the variety of food. But these suggestions are not made for his benefit. Many people, when preparing for their first outing, imagine they can enjoy, for several weeks, subsistence upon only two or three coarse varieties of food; and forget that there is considerable difference between sleeping upon yielding springs and hair mattresses in a warm room, and stretching their aching limbs upon hard ground, unprotected from the elements; and thereby spoil what might otherwise have been a delightful outing. There are hardships enough, and unpleasant features enough, in the best-planned mountain trip, without making such radical changes in one's manner of living. One cannot enjoy either grand scenery or a good temper with a disgruntled stomach or a chilled body. Mountain trips should be for pleasure and recuperation, not for discipline and stoicism; and, until one learns for himself what can be dispensed with, he should take plenty. In this article we have endeavored to present an acceptable medium between burdensome superfluity and dissatisfying paucity. To the lover of nature a mountain trip affords limitless opportunities for instruction and delight; and let us hope that the reader's next one will be so arranged that its greatest possibilities shall be realized.

TO TEHIPITE VALLEY FROM THE KING'S RIVER GRAND CAÑON.

BY J. M. STILLMAN.

During the past summer a party of Sierra Club members, Professors Chas. N. Little, Geo. M. Richardson, Thos. D. Wood, and the writer, being established in camp in the Grand Cañon of the King's River, made an excursion to Tehipite Valley on the Middle Fork, under the guidance of that pioneer resident of the King's River country, Mr. John Fox.

As the route we followed under his guidance is not the usual route, and is considerably shorter, a brief description will perhaps not be without interest to members of the Club.

The usual route leads up Copper Creek, through Granite Basin, and is usually estimated at from three to four days each way. The trip by Fox's route can be accomplished easily in two days. We left Fox's bridge across the South Fork at about 4 P.M. on July 29th, following down the north bank of the river for about a mile and a half on a well-beaten trail to the cañon of Grizzly Creek. The trail then turns to the right before reaching the creek, and rises sharply up the east bank of the cañon. About two miles from this turn, we crossed Sheep Creek, a branch of Grizzly, and about half a mile or so farther on we camped, staking our burros in the rather sparse grass on the divide between this branch and the main creek, making our own camp somewhat farther down the slope toward Grizzly Creek. It is not a very good camping-spot, as water is to be obtained only by a steep climb, and feed is poor. The next morning we took the trail again, crossing Grizzly Creek



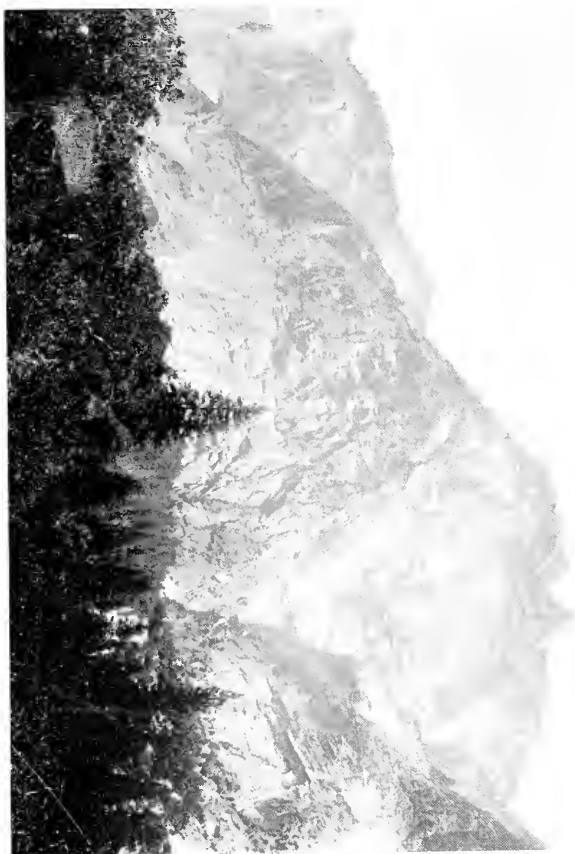
LITTLE DOME.
Group as depicted by Walter A. Starr.

about half a mile or more from our camp. About two miles farther the trail passes Wildman Meadow (a good camping-spot), turning sharply to the right, though there is a trail which forks from the main trail and passes to the left down through the meadow. Shortly after passing Wildman Meadow, a small creek (Grouse Creek) is crossed, and the trail then climbs a ridge, crossing it just below a lofty and striking granite dome, which Mr. Fox calls Mt. Harrington. The summit of the ridge on the trail is about eight thousand feet in elevation, and Mt. Harrington cannot be much under nine thousand feet high. After crossing this spur ridge we descend, traversing a broad valley, well covered with manzanita and deer-brush. The trail passes well down the valley, to avoid brush and rough rocks bad for animals. A small stream flows through this valley, the last water before the main divide is crossed. After clearing the brush, the trail rises on the shoulder of the ridge beyond, and maintains its elevation fairly well on the face of the slope until it reaches the lightly timbered saddle of the main divide, called by our guide "Happy Gap." The elevation of the monument on the trail at this summit is not far from 9300 feet. The pass commands superb views of South and Middle Fork regions.

From this point the trail runs quite directly about forty-five degrees west of north (true meridian), or about sixty degrees west of north by the needle. Sheep graze through this region, and the trail scatters and ramifies more or less in the region through which the trail first passes on descending from the pass. The route, however, lies a few hundred yards to the right of a stream which heads a little west of Happy Gap, and finally crosses, by a rough bit of trail, a lively stream (Silver Creek) just above its junction with the westerly branch. From this point on, the trail was obscure, there being no signs of recent travel. An occasional stone monument, and the old ax-marks on

trees and brush were the only evidences in many places of a trail. The trail was cleared some three years ago, by Mr. Fox and others; but sheep were taken over it one year, and did serious damage to it. After crossing Silver Creek, the trail rises sharply on the eastern bank, and keeps down the creek, but quite a distance above its bed, until an opening is reached, where are the half-burned remains of a rather elaborate camp. This is Big Oak Flat. It is not very flat, except in comparison with the country round about, which is generally "on edge." The elevation of Big Oak Flat is not far from 6000 feet. Here we made camp for the night, climbing down the steep bank of Silver Creek a hundred feet or more for water. Here, also, the next morning we left burros, blankets, and everything else we could spare, and started on foot to complete the trip, as the trail seemed unsafe for the pack-animals.

The trail from this point was at times difficult to find, being innocent of hoof- or foot-prints, and most easily traced by the old ax-marks on the brush. In direction it is quite straight, keeping several hundred feet above Silver Creek on the flank of the cañon, until the monument which marks the summit of the wall of the cañon of the Middle Fork is reached, about two hours from our camp at Big Oak Flat. The monument is about 1600 feet above the margin of the river. At this point we abandoned the old trail-marks, as Mr. Fox believed that the old trail had been too much obliterated to be of service in its present condition, and sought a route down the crest of the steep ridge, at the head of which stands the monument above mentioned. The descent to the river is steep, and, in its present state, difficult, and impracticable for saddle- or pack-animals. The rock which forms the cañon walls at this point is red, splits and splinters easily, and its insecurity is one of the chief difficulties of this part of the trail; but on the ridges it is usually covered with brush or undergrowth, so



EL. COMMANTE.

From a photograph by Walter A. Stur.

that travel is not dangerous. Much time was consumed in prospecting for a route, but we finally found our way down, having occupied two hours and forty-five minutes in making the descent. Our trail struck the river, perhaps a mile and a half below the widening of the Tehipite Valley. A trail, little used, but clearly to be traced, runs up the river until sheared off by a smooth cliff of red rock, which forces animals to ford through the edge of the water, though foot-travelers can find a route over the point above the cliff into the Tehipite Valley proper.

Tehipite Valley needs no description here. Its most striking feature is beyond question the beautiful Tehipite Dome, described by Muir in the *Century Magazine* of 1891, and certainly rivaling in grandeur and symmetry any of the Yosemite cliffs, though not so high as some of those. The Tehipite Falls, by which Crown Creek plunges in two principal leaps into the valley west of the dome, enhance the beauty of that wall of the cañon. On the opposite side of the cañon from Tehipite Dome, is a high shoulder, surmounted by a pyramid-shaped mass, which we thought fully equal in picturesque beauty to any feature of the South Fork Cañon, as seen from the valley below.

On the same (south) wall of the valley, and below the pyramid just mentioned, is another very striking feature of the walls. This is of the red rock characteristic of so much of the Tehipite walls; and, resulting from the way in which this rock splits and weathers, the crest of this cliff is sculptured into no very strained likeness to some of the spreading ruins of ancient fortresses which crown so many of the eminences in Europe.*

Tehipite Valley is much smaller than the Yosemite or the King's River Grand Cañon, only two or three miles in

* Since this article was written I hear that the pyramid-crowned mass was named "El Comandante" by Winchell. This is on the authority of Mr. Solomons.

length and probably not much over half a mile wide, in so far as its level floor is concerned. It is wilder in aspect than the Grand Cañon. Its meadows were covered in large part with brakes, thimble-berry bushes, and other growth waist-high. Its elevation is considerably below that of the Grand Cañon. The barometer gave 3900 feet elevation where our trail struck the river below Tehipite, while 4500 feet was the observation at Fox's Cabin, in the lower end of the Grand Cañon. The floor of Tehipite is not much higher than where we struck the river — perhaps averaging about 4000 feet. The California bay and the poison-oak, of which we found a little in Tehipite, we had not seen in the Grand Cañon.)

The Middle Fork is nearly as large a stream as the South Fork; and our fishermen found the fishing fully as good as in the South Fork. Trout formed our staple diet during our stay. Having no blankets and a short stock of provisions, we spent but two nights in the valley, sleeping, however, very comfortably by the camp-fire, as the nights were quiet and not cold. On the morning of August 2d, we returned, retracing our route to our Big Oak Flat camp, whither Mr. Fox had preceded us the day previous, to care for the burros.

Our actual traveling-time on the return trip will perhaps be of service to such as may take the trip:

	HRS.	MINS.
From bank of Middle Fork to the monument on summit of wall	1	35
Thence to camp at Big Oak Flat	2	15
Thence to Happy Gap (summit of divide)	2	25
Thence to Burns' Sheep Corral (our camp for the night)	1	20
Thence to Fox's Bridge (South Fork)	3	05
Total actual traveling-time	10	40

The general direction of the route between the terminal points above given is about forty-five degrees west of the

true meridian, or about sixty degrees west of north by the compass. Happy Gap is almost directly on the line between Fox's Bridge and the point where we struck the Middle Fork. We estimated the actual distance on the trail at not far from twenty-five miles, if thirty miles represents the distance from Sequoia Mills to Fox's Cabin. Comparatively little labor would convert this route into a passable pack-trail; but unless the sheep were kept off, there would be comparatively little inducement for any one to construct a trail. It is a pleasure to the Sierra traveler to find a region where the vegetation shows no traces of recent devastation by sheep. The luxuriant growth in Tehipite is a pleasant change from the close-nibbled and hoof-beaten meadows of the country in and around the South Fork Cañon. The route described presents an excursion which will be full of interest to the lover of beautiful scenery.



The accompanying sketch of the route is based upon Mr. Le Conte's Sierra Club map, and is modified only as seems necessary to give a correct notion of the route, though no claim to accuracy is here made. The distance by trail and the angle of the South Fork and Middle Fork in this region is surely not correctly presented in the county map, which served as the basis of that part of the Sierra Club map, if I am correctly informed. I think the sketch here given is a nearer approximation to the facts.

AN EARLY SUMMER EXCURSION TO THE TUOLUMNE CAÑON AND TO MT. LYELL.

BY THEODORE S. SOLOMONS.

Accompanied by Miss Stella Sweet, Miss Bertha Sweet (U. C. '96), Miss Mabel Sweet (U. C. '99), Miss Mabel Davis, and Mr. Adolph Sweet (U. C. '98), I left Yosemite Valley on the 13th of June, by the Yosemite Falls Trail. A week before, snow covered the lower slopes above the walls of the Valley, but the snowfall in all but the highest parts of the range having been of recent occurrence (about May 1st), it had melted rapidly; and we did not encounter it as a continuous sheet until we began the ascent of the long hill leading to Snow Flat.

We reached Lake Tenaya on June 14th. The lake itself was still entirely frozen, but about its northward shores, for some miles back, there were patches of bare ground aggregating about half the total surface; and short "dry" feed was already well up, in sunny spots. On the 16th, the summit of the glaciated headland opposite Tenaya Cliff, was climbed. The highest point was found to be about a mile from the lake, and to command a spacious view. On the 17th, the party ascended the creek that enters the lake from the North, following the old Virginia Creek trail (the initial portions of which, at least, we found reblazed with the new and characteristic T mark of the cavalry) until it crossed to the west side and ascended the western branch. Pursuing the eastern, and apparently larger, tributary, we came to a number of lakes and pools discharging their waters in both directions. To the north the water flowed into Cathedral Creek, by which we hoped to reach the



IN THE UPPER TOULMINE CAÑON LOOKING TOWARD THE NORTH WALL.

From a photograph by Theodore S. Solomon.



Tuolumne River; but soft snow preventing this, we returned to Tenaya. On the 19th, we continued along the Tioga Road, now nearly free of snow, to within two miles of the Tuolumne Meadows, when we turned abruptly northwest, passing over the low divide, and camped at noon on the southern bank of the Tuolumne, about midway between the Meadows and the Virginia Trail crossing. The following morning we started with knapsacks down the river. There was carried among us about ninety pounds weight, made up, besides camera and plates, of no more than the severely simple outfit of food, utensils, and sundry necessities, carried by previous parties of Club members through the cañon.

I found the southern side easier traveling than the northern; and the views of the walls and cascades are also much finer from this side. We made the Le Conte Cascade at 11 A.M. of the 21st, and Return Creek early next morning. From this point I made, alone, a short excursion down the river and found the cañon side very rough, steep, and brushy; but I remember that the northern side, also, was found to be of the same character. Hence, I am in doubt as to their comparative advantages, below Return Creek. It must be borne in mind however, that the southern side of the Muir Gorge is a more or less continuously steep wall of great height; but, except in the highest water, it is easy to ford the river at many places between the two points mentioned; or, indeed, log crossings may usually be found.

The water-line showed a subsidence of about four feet from the highest water-mark of the season; but the cascades, nevertheless, were conspicuously finer than when I saw them in August, 1894. I shall make and place in the Club-rooms a diagram of the upper portion of the cañon as far as Return Creek, showing the best route of descent.

On our return, we reached camp early in the afternoon of the 23d. On the 24th, we arrived at the head of the

meadow at the base of Mr. Lyell, made the ascent the following day over a great deal of low-lying snow, and returned to Yosemite by the Cathedral Peak trail, reaching the Valley on the 28th. On Summit, Cathedral, and Long Meadows, the snow was still deep, although on the Tuolumne Meadows and on the high slopes on either side, especially to the north, there was not a vestige of it.

I think our experiment proved the ability of the average young woman, in good health, to endure without great hardship many of the most difficult feats of mountaineering in the High Sierra. Our trip was a good test in several ways. We walked the entire distance; much snow, swollen streams, and wet boggy meadows made it impossible to keep our feet dry in the daytime, and often also at night; yet none of the ladies ever suffered from so much as a cold. In the Tuolumne Cañon, than which there is scarcely rougher traveling to be found anywhere in California, I found them considerably slower than athletic young men, but fully as able otherwise to cope with all the physical difficulties; and their capacity of endurance of cold water, loss of sleep, snow, and certain forms of muscular fatigue, somewhat greater, perhaps, than that of the average young mountaineer of the other sex.

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

ON THE NAMING OF MOUNTAINS.

As the Sierra becomes better known, the problem of finding suitable designations for its peaks grows in urgency and in difficulty. Our heritage of Indian names seems never to have been very large—at least within the High Sierra; and the greater part of what might have been saved from that source, has now been irrecoverably lost under the spendthrift régime of sheep-herder and prospector. On the other hand, the nomenclature which these later nomads have invented is generally so void of euphony and dignity—is often so unutterably vulgar,—that one can hardly regret its scantiness. Here, then, is an opportunity for valuable and lasting service to society—or for lasting harm. By common consent, the explorer or climber has the right of suggestion or nomination; but since there is no counter nomination nor acknowledged authority to alter or amend, his nomination, of itself, is practically final. We “stand within his danger,” then, indeed; all that the court can do directly, is to entreat him to “be merciful.”

Indirectly, however, something may be done by a general comparison of views as to the considerations which should govern in the naming of these noble landmarks. As a good opening to such a discussion, we present the following suggestions, made by Prof. Bolton Coit Brown, in a communication which, we regret to say, our limited space does not permit us to print entire:

The letter opens with a vigorous onslaught on the current fashion of naming mountains in honor of men, even though these be “men eminent in the physical sciences.” Men and their reputations inevitably fade out of remembrance. Since the name alone can abide, it should be chosen on grounds of inherent fitness, not because it may serve for a passing compliment. The writer frankly acknowledges his own transgressions in this regard, but professes repentance and reformation. In reply to the suggestion that the naming be left to those “in authority,” he says:—

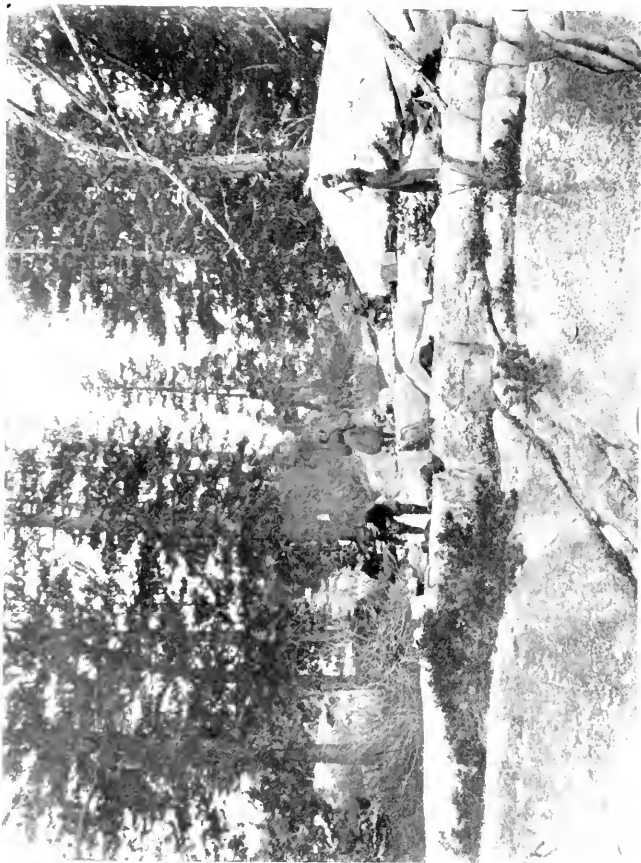
“Who indeed can rightly be said to have authority over the Sierra Nevada? Politically, they are the property of the seventy

million people of the United States; but in a wider and truer sense they belong to the human race, and will rear their untroubled summits when the memory of the United States is kept alive in archaic records and museum specimens. Their use to humanity is not that of a collection of memorial monuments minus the epitaphs. Their highest, most permanent, most important use is not to feed sheep, not to raise timber, not to mine gold, not to furnish money-making shows for hotel-keepers, not to afford trout-fishing and bear-hunting, not even for quarrying granite or storing water supplies. For all of these things they may be used; for some of them, and to some extent, they may be well used; but it remains true that these are not the highest uses of the mountains. These uses serve but material ends, and for the gratification of the inherited, but now useless and detrimental, passion for chasing and killing.

"It is not easy, probably it is not possible, exactly to define what the highest uses are. But in general we may say that they are the uses which men put them to when they go to them for the love of them, for the exaltation of spirit and the exhilaration of body which comes from them. Underneath what is called the 'sport' of mountaineering—and a true and noble sport it is,—there is something more than mere sport in the ordinary use of the word. This something is not in the sport of horse-racing, of whist-playing, or of prize-fighting; it is not in any sport except those which touch the nobler sides of human nature. Mountaineering has two sides, the athletic and the æsthetic. The athletic side is not at all affected by names; the muscular exercise is just the same, no matter what the name is. But the other side—the poetic—is affected by names; is affected by whatever is or is not poetic, is or is not harmonious, beautiful, fitting; and this, either to the ear or to the mind.

"Much of the charm of the mountains depends upon the absolute harmony of all that is there. There is no intrusive foreign thing in them; there is no inappropriate thing; there is no vulgar thing. They do not insolently thrust in your face silly placards about Hobson's Rat Poison or Johnson's Pills; they do not disfigure themselves with lying real-estate signs; the names of no political candidates insult the trees; there are no yelping curs, blatant voices, or jangling street-cars; there is no odor of underground horrors or discomfort of dirty crowds. In the mountains all is large, quiet, pure, strong, dignified; there all is beautiful; each thing is a perfectly appropriate part of that unity which we call nature. . . . All is wholesome to the body, interesting to the mind, and agreeable to the senses. And the state of mind they tend to put us in may be called poetic.

"To name some of the parts of this complete unity which we



A MAKESHIFT CAMP, NEAR LAKE TENAVA.
From a photograph by Theodore S. Solomons.

call nature is a practical necessity; and the fundamental reason for trying to name them well is, that we do not wish the names to jar and to be out of harmony with the rest. We do not want to feel the only thing man adds to the mountain—the name—as a discord. It is a distinct unpleasantness to be obliged to know a sublime and beautiful mountain gorge as being *Bubb's*, for instance. The same is true, in degree, of any name that suggests a *person*.

“Why should we not have—what is our excuse for not having—names that are appropriate in sound and sense? A good name will harmonize; it will, in euphonious syllables, either appropriately describe (as does *Half Dome* or *Cloud's Rest*), or to be to us a meaningless, euphonious, appropriate sound (like *Tahoma*, *Shasta*, *Kearsarge*), which may designate that group of impressions which we call the mountain. And it will not force on all comers any particular piece of suggestion or sentiment, especially none of a personal sort, which the namer may have happened to think of. Each person ought to have a fair chance to have these things mean what they will to him, and should not, as a rule, be afflicted with *Twin Sisters*, *Devil's Slides*, or *Bridal Veils*. All such pseudo-romantic appellations smack of childishness and of cheap sentimentalism.

“Sometimes it will happen that a personal name is phonetically good, and yet not wishy-washy. In *Ritter*, for example, we seem to hear the clink of rattling stones. *Campbell*, *Stanford*, *University Peak*, *Gardiner*, *Whitney*, and *Williamson*, however, are bad, as also are *King's Cañon*, *Bubb's Creek*, and *Cartridge Creek*. *King*, *Brewer*, *Barnard*, are poor; *Woodworth*, *Ericsson*, *Jordan*, and *Tyndall*, are middling; *Blue Cañon*, *Tioga Road*, *Tehipite Valley*, *Yosemite*, *Roaring River*, are good. *North Dome*, *South Cañon*, *East Lake*, are inoffensive, but absolutely colorless and flat. *Bullfrog Lake* is not bad; *Lake Eleanor* is very beautiful. Of descriptive names, I should call *Cathedral Spires* middling; *Saw-Tooth Mountains* and *Arrow Peak*, good. Tuolumne Meadows, in the common pot-bellied corruption of it—Tuh-woll'umny—is absurd; but when given rightly, as I have heard an Indian speak it,—Tu-ah-lum'nee, in distinct syllables,—there is hardly a more beautiful name in the mountains. *Sierra Nevada* falls most musically upon the ear; and, taken with its meaning, is, perhaps, the best name of all. No, not all—*Shasta* is the best of all.

“The desirable thing, then, in naming is not “authority,” nor is it to drag in some man by the hair to “honor” him; but a consideration of the significance and suggestiveness of words to the mind, and of their musical suggestiveness to the ear. This, in the long run, will satisfy us best; and it will, in a much longer run, satisfy best our friends of the future.”

A TRAMP IN THE EMERALD BAY REGION.

To the Editor of the Sierra Club Bulletin.

DEAR SIR:—Having recently enjoyed a most delightful outing in the mountains to the west of Lake Tahoe, it has occurred to me that a few notes of the trip might be of interest to the members of the Sierra Club. Our party, consisting of R. R. Dempster, my brother (J. S. Hutchinson, Jr.), and myself, left the lake at Emerald Bay, carrying our blankets and several days' provisions. We camped the first night high up on the slope of the ridge which rises to the northwest of the bay. We were in good position to examine a large part of the cañon of the stream which runs down to Emerald Bay; and I would recommend the following route as being easier than the one followed by your party last year. From the bay westward for three-quarters of a mile, or a mile, it is certainly easier going on the south side of the stream; but just below where the cañon makes a rather abrupt turn to the south, it is better to cross to the north side, and follow a depression running off a little north of west to the base of the smooth, striped cliff which forms the northern wall of the cañon, and then bows around and brings you out on the northern shore of Eagle Lake. Above Eagle Lake, keep along near the stream until you come to a cascade and a rocky barrier, which, at first sight, seems impassable, save by a wide detour to the north. You will notice, however, a few hundred yards to the right (north) of the cascade, a brush-covered shelf on the face of the rock barrier, and by a short, hard scramble through this brush, and along the shelf, you can reach the top in safety. From this point to Glacier Lake there is no difficulty.

Leaving Glacier Lake to the right, we climbed high up over the northwestern shoulder of the ridge which forms the eastern side of Rockbound Valley, passing *en route* a little snow-choked lake which does not appear on the U. S. Geological Survey map. Our camp that night was high up on the eastern side of Rockbound Valley, overlooking the whole cañon of the Rubicon.

Next day we followed up the cañon of the Rubicon, keeping well up on the eastern slope, and around the base of Dick's Peak, or Crystal Peak, as it is called in Glen Alpine. Early in the afternoon we crossed the pass at the head-waters of the Rubicon, and plunged suddenly down into Desolation Valley (Devil's Basin on the U. S. Geological Survey map). Then, crossing the slope to the south of Heather Lake, we made our way without difficulty down to Susie Lake (spelled *Sazy* on the map), near which we went into camp.

Our last day's trip was one which is probably very familiar to many members of the Club:—from Susie Lake across to Gilmore

Lake, thence to the top of Mt. Tallac, and finally down one of the great rocky chûtes on its eastern face to Tallac. The whole trip was a charming one, full of hard work, but replete with fascinating surprises.

It may be worth while to note what is evidently a misprint in the map of the U. S. Geological Survey. The altitude of Eagle Lake is given as 8,540 feet. It should undoubtedly be 7,540.

Respectfully yours,

LINCOLN HUTCHINSON.

SAN FRANCISCO, September 27, 1896.

PRIVILEGES OF MEMBERS OF THE SIERRA CLUB.

To the Editor of the Sierra Club Bulletin.

DÉAR SIR:—On my recent trip to King's River Cañon I found that an erroneous notion as to the object of Sierra Club organization is held by some of the men we encountered—that it aims to establish game preserves for its members, to the exclusion of the public from hunting and fishing privileges. On my way to Millwood I had to combat that opinion expressed by the stage driver, and again in the valley, by the guides; also, by a resident there who has a claim upon some meadows and charges for pasturage of animals. These men profess to believe that the Club has been actuated by selfish motives in inducing Uncle Sam to look after the sheep-men and protect the sequoia groves by a patrol of soldiers. They claim that members of the Club and a favored few get of the military officers permits to carry arms and camping privileges.

Respectfully yours,

J. S. HUTCHINSON.

SAN FRANCISCO, August 20, 1896.

OUR SISTER SOCIETIES.

It is a royal *menu* that is presented the lover of nature in Sierra Club exchanges accumulated since our last issue. In fancy he may ramble under the safe guidance of their many contributors over the rugged hills of Scotland, through the pleasant and picturesque Carpathian mountains of Hungary, or attempt the most arduous ascents among the ragged peaks of Norway, the Swiss Alps, the Canadian Selkirks, the snowy summits of Oregon, or the Alpine ranges of far New Zealand. It is an interesting brotherhood, this mountain-seeking fraternity, and though they clothe their speech in various outward forms, they all speak the same heart-language.

Our northern neighbors, the Mazamas of Oregon, make their

first appearance in a journalistic way in Volume I, No. 1, of *MAZAMA: A Record of Mountaineering in the Pacific Northwest*. It is perhaps the stateliest periodical among our exchanges, handsome in dress, type, and paper, generously illustrated with fine views of scenery about Mts. Hood and Adams, and with an attractive array of contributors. The title "Mazama" will suggest the purposes of the organization, being a synonym for the mountain goat.

APPALACHIA for November will be found of unusual interest to our members. It contains some well-written accounts of the Appalachian Club excursion to the Selkirks, illustrated with excellent views. Professor Fay gives a graphic account of the excursion in which our fellow-member, Mr. P. S. Abbot, lost his life, and there is a portrait of Mr. Abbot, and a biographical sketch of his life, from the pen of Prof. Palmer. Our Mr. T. S. Solomons has, in the same number, an interesting illustrated account of the Grand Cañon of the Tuolumne.)

The last number of the journal of the SCOTTISH MOUNTAINEERING CLUB, well exemplifies that for the true mountain-lover, much pleasure and healthful exercise may be obtained without seeking the loftiest or most inaccessible mountains, and he need not dispense with the elements of excitement and danger when scrambling amongst the rugged Scottish mountains.

From the Scotch Highlands to the mountains of New Zealand is a "far cry," but the NEW ZEALAND ALPINE CLUB JOURNAL will carry us quickly there, and we shall find ourselves in a grand and inviting region. Its many peaks, of 8,000 to 10,000 feet high, and its Mt. Cook, about 13,000 feet high, evidently will afford ample resource for the members of the New Zealand Alpine Club, and its journal is doing much to attract interest to the exploration of the "New Zealand Alps."

The bulky annual number (Aabog) of the Norwegian TURISTFORENING (Kristiania) will not be found generally easy reading for Sierra Club readers, with the exception of two or three articles in English, but the volume contains some enticing pictures of snow-clad and rugged mountain scenery well worth laboring to visit.

The sixteenth Jahrgang des SIEBENBÜRGISCHEN KARPATHEN-VEREINS presents some interesting accounts of mountain excursions, as also some interesting glimpses of life and customs in that mountain frontier between Hungary and Roumania.

The new Club Alpino Siciliano has begun the issue of a quarterly journal, *SICULA*, at Palermo. New bulletins are at hand from the Società Alpina Meridionale (Naples), the Club Alpine Belge (Brussels), and the Club Alpine Suisse.

From our cousins, the Geographical Societies, there are several

publications containing many articles of interest and value. Space will not permit of extended reference, but they may be seen on the shelves at our club-room. The NATIONAL GEOGRAPHIC MAGAZINE for October contains an article on California by Senator Perkins; BULLETIN No. 3, 1896, of the American Geographical Society contains an interesting article by T. C. Russell on Mountaineering in Alaska; and Vol. I, No. 5, of the BULLETIN of the Geographical Club of Philadelphia consists of an illustrated account of the Peary Auxiliary Expedition of 1894, by Henry G. Bryant.

The Club is also in receipt of late publications of the VEREIN FÜR ERDKUNDE ZU LEIPZIG; and, last but not least, of geological and topographic maps of the Kamloops District on the line of the Canadian Pacific, from the Geological Survey of Canada.

J. M. STILLMAN.

VIEWS OF THE CANADIAN ROCKIES.

For the striking views of the Canadian Rockies which illustrate the first article of this number, and for the fine portrait of Philip S. Abbot which accompanies the second, we are indebted to the courtesy of Professor Charles E. Fay, editor of APPALACHIA, who has generously permitted the use of plates belonging to the Appalachian Mountain Club. The circumstances of their printing prevented the making of this acknowledgment with the illustrations themselves.

KIT CARSON'S TREE.

Dr. Henry Senger informs us that the famous tree which stood at the summit of Carson Pass, above Hope Valley, was cut down, not by the United States surveyors, as previously reported in the BULLETIN, but by a Mr. Thornburgh, of Markleeville; and that the section with the inscription commemorating Kit Carson's passage is now preserved in the rooms of the Mining Bureau, Pioneer Building, San Francisco, where it may be seen by visitors.

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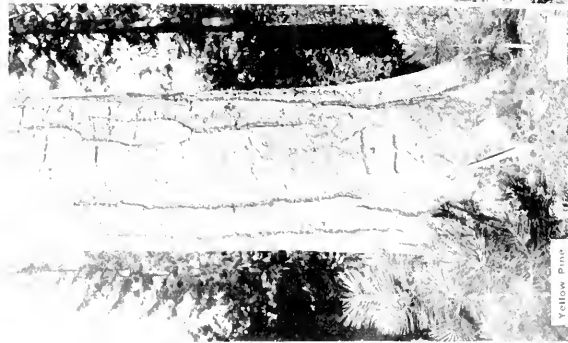
Publication by the SIERRA Club, should
distribution and sale of the
Bulletin be desired, should be
sent to the Secretary of the Sierra Club,
San Francisco, California.







Sugar Pine—*Pinus Lambertiana*



Yellow Pine

Yellow Pine—*Pinus ponderosa*



Black Pine—*Pinus jeffreyi*

CALIFORNIAN PINE-TRUNKS

From photographs by John G. Lemmon.

SIERRA CLUB BULLETIN.

VOL. II.

SAN FRANCISCO, MAY, 1897.

No. 2.

CONIFERS OF THE PACIFIC SLOPE—HOW TO DISTINGUISH THEM.

BY JOHN G. LEMMON.

NO 1.

It is not difficult to distinguish the great classes of plants from each other, or the groups within these classes, if only the attention is directed to certain of their features which are characteristic, ignoring, for the nonce, those they possess in common with others. The organs most relied upon for distinctions are those of the fruit, for this is the product of the supreme effort of the plant. Through life it strives, by various devices, to escape enemies, overcome crowding neighbors, and bring forth its diversified fruit. Locality, also, and characters of the stem and foliage, as well as the microscopical structure, may be useful in determination.

There are about 300 species of oaks on all the earth, but so peculiar is the fruit of the oak—the acorn—that an oak need never be mistaken for other trees. So, too, of other families, the pod-bearers, the grain-bearers, etc.

“Conifer” tells in one word a volume of information concerning a certain very interesting order of plants, which it is the purpose of this article to present and briefly characterize. This will be best done by dividing, first, the great order, then the groups, again and again, giving the chief characteristics of each; then, when the species is reached,

pointing out the most salient and distinguishing characteristics that may enable the reader, with little painstaking, to recognize and hereafter *know* many, if not all, of the sixty-three species of *Coniferæ* of the Pacific Slope.* In this connection, let me call the attention of the reader to the immense preponderance of the cone-bearers in the forests of the great Northwest. Of oaks, ashes, maples, and other broad-leaved trees, we have few distinct groves on this coast, and no large forests,—if we except the few oak groves, several miles in extent, that here and there dot the interior valleys of California,—while nine tenths of the vast mountain forests are composed of narrow-leaved-evergreen, pitch-yielding, and particularly, cone-bearing trees. So, if we learn to know *them*, most of the great forest wealth of Northwest America will be comprehended.

Another consideration: this number of species (sixty-three) is no small part of the world's Conifers, the rest of North America, including Mexico, having little more than half as many (thirty-six), and the broad continent of Eurasia, a region nine times as wide, having only fifteen more (seventy-eight).

If the observer could take in all the cone-bearing forests of the Northwest at one view, examining them at leisure, group by group, he would find them separated by fundamental modes of development into two grand divisions—SPIRALES and VERTICILLATÆ. The largest division, the SPIRALES, develop their leaves and bracts in spirals, or coils, about the branchlets, and the cone scales are similarly coiled about the axis from base to apex. The VERTICILLATÆ, on the contrary, have their foliar and fruit organs arranged in circles about the stem and cone, of two or

* The Pacific Slope (including the enclosed Great Basin) is a naturally delimited region, with the Rocky Mountains for its eastern boundary. Most of its forests are north of the Mexican line. California being but a section of this region, sharing many of its trees with the rest of the slope, it is inexpedient to attempt a description of California Conifers alone.

three members each, rarely of four or six, in a circle, one above the other.

*DIVISION I. SPIRALES—SPIRAL-CONE
TREES.*

Most of the world's cone-bearers being *Spirales*, we shall gain by studying them first. They divide into three distinct tribes:—

TRIBE 1. *ABIETINÆ*.—Very resinous trees, limited to the Northern Hemisphere; further distinguished by being monœcious (male and female flowers on separate branchlets, of the same trees); fruit a woody or leathery cone or bur, with an elongated axis, each scale bearing on its upper surface, two, usually winged, seeds.

TRIBE 2. *ARAUCARIÆ*.—Less resinous trees, indigenous to the Southern Hemisphere, and contrarily distinguished by being dicecious (flowers separated on different trees); the cone-scales bearing each one seed. This tribe being represented here only by cultivated trees, like the "Norfolk Island Pine," "Monkey Puzzle," etc., though useful for comparison, may now be dismissed.

TRIBE 3. *TAXODIÆ*.—Still less resinous trees of both hemispheres, are monœcious; cones small; the scales shield-shaped, or club-shaped, not changing direction at maturity, each bearing two to six seeds. Abundant in past ages, only a few species extant now, including our two *Sequoias*,—to be treated in their order.

*TRIBE ONE. ABIETINÆ—NORTHERN
PITCH TREES.*

We shall be principally occupied in this paper with presenting the salient characteristics of the northern pitch trees. They are conveniently divided by certain characters of the leaves into two unequal subtribes:—

SUBTRIBE A. FASCICULARIÆ.—Trees with the conspicuous secondary leaves in fascicles, or little bundles of two, three, or five (the pines), or in elongated tufts of twenty to sixty leaves each (the true cedars and larches); cones requiring one or two years to mature.

SUBTRIBE B. SOLITARIÆ.—Trees with all the leaves solitary, not in fascicles or tufted, and all very short—one half to two inches; cones maturing in one season (the spruces, firs, etc.).

SUBTRIBE A. FASCICLE-LEAVED PITCH TREES.

Separated by foliage duration into two classes:—

(a) PERSISTENTES.—Trees with evergreen persistent leaves; cones requiring at least two seasons to mature (pines and cedars).

(b) DECIDUÆ.—Trees with small, slender, mostly tufted, leaves, on short, spur-like branchlets; maturing their cones in one season; peculiar for their promptly deciduous leaves (the larches).

We come now to the first of the fascicular and persistent-leaved genera.

CLASS A—PERSISTENTES.

FIRST GENUS, PINUS—THE TRUE PINES.

Very numerous species of trees; leaves in fascicles of two, three, or five each (one species single-leaved), sheathed at base with papery scales; fruit a conical, cylindrical, or globular cone or bur, requiring two years to complete its growth (one American species requiring three years); cone-scales with a protuberance (umbo) on the exposed portion (apophysis), either at the apex or on the back; male flowers numerous, spike-like, one half to four inches long, forming a loose rosette near the end, or a ruffle lower down upon the male branchlets. Separated chiefly by characters of the wood into two subgenera.

SUBGENUS I. STROBUS—*The Soft-wood or White Pines*.—Trees with the apophysis of the cone-scale thin, the umbo at the apex, and devoid of a prickle; leaves short and always in fives, their sheaths loose and deciduous.

SUBGENUS II. PINASTER—*The Hard-wood Pines*.—Trees with the apophysis enlarged, the umbo on the back, in most species terminating in a prickle or stronger spine; leaves variable in number, usually long.

SUBGENUS I. STROBUS—SOFT-WOOD OR WHITE PINES.

These comprise the largest and most valuable pines in the world, most of them in Northwest America. Bark thinnish, finely checked; wood soft and white; foliage light green; leaves always in fives. Five species in two groups:—

I. ELONGATÆ—*Long-cone Lumber Pines*.—Very large and valuable trees, affording long shafts for lumber; cones pendent, cylindrical, 8 to 26 inches long; three species.

II. ALPINÆ—*Alpine Pines*.—Small, often depressed, Alpine or sub-Alpine trees, on certain limited elevations.

GROUP I. ELONGATÆ—LONG-CONE PINES.

Chief of the Long-cone White Pines is the chief of all the family of pines,—

I. *Sugar Pine* (*Pinus Lambertiana*). — No one who, even from the window of a fast-flying railway train, has ever seen this majestic tree with its enormous, smooth trunk towering aloft, and suspending with long out-reaching upper limbs, its matchless cones, like brown Chinese lanterns, will ever forget the sight. The trees are of the largest dimensions, often attaining a height of 200 to 300 feet, with a diameter of ten to fifteen feet. Cones usually bronze-green until ripe, two to three inches thick until opened, then four to six inches in diameter and ten to twenty-six inches long—the longest in the world. The

Sugar Pines never form exclusive forests, but are scattered among other trees at middle elevations of the Sierra, Coast, and Southern Cascade ranges. Its nearest relative is,—

2. *Arizona White Pine* (*P. strobiformis*).—Large trees, found on the highest mountains of Arizona and New Mexico, distinguished by the elongated spoon-shaped cone-scales, the cones being two thirds the size of those of Sugar Pine. The third species of the Long-cones is,—

3. *Mountain Pine*. (*P. monticola*).—Small light-barked trees of sub-Alpine altitudes, rare in the Sierra, northward to the mountains of Oregon and Washington, eastward to Montana, where it forms quite extensive forests; distinguished by its smaller and narrower cones, six to twelve inches long, the scales thin, weak, usually reflexed at maturity.

GROUP II. ALPINÆ—ALPINE WHITE PINES.

Small, often depressed trees, on peaks of the southern Rocky Mountains and Great Basin region. Cones small, oblong, or ovate. Two species:—

4. *Rocky Mountain White Pine* (*P. flexilis*).—Standard or sometimes depressed trees of Colorado peaks, extending to the mountains of Nevada, Northern Arizona (a large-cone variety), and the Central Sierra; branches slender; cones oblong, four to six inches.

5. *White-bark Pine* (*P. albicaulis*).—Very white-barked, sturdily erect at sub-Alpine localities in the northern Rocky, the Sierra, and Cascade Mountains, or depressed to solid platforms in the high passes; cones ovate, two inches long, set close upon the short, stout, erect, white, annual stem; seeds globular, wingless.

SUBGENUS II. PINASTER.—HARD-WOOD PINES.

Taking up the Hard-wood Pines, we find a much larger subgenus, of species variously grouped, first dividing

according to position of male flowers and the cones into two sections, viz:—

SECTION 1. TERMINALES—with the flowers and cones arising just below the leaf-buds;

SECTION 2. LATERALES—with these organs arising on the side of the growing shoots of the season, some distance below the terminal bud.

SECTION ONE. TERMINALES.—TERMINAL-CONED PINES.

Nineteen species, separated by characters of the leaves and cones into two sub-sections: (*a*) *Brevifolia*,—with very short leaves, one to two inches long, their sheaths deciduous in the first two groups of the section; and (*b*) *Fracticonæ*,—cones breaking from the stem by a transverse fracture through the base of the cone; sheaths persistent.

Sub-section A. Brevifolia—*Short-leaf Pines*.

Usually small trees, with small cones and male flowers.

Three very diverse groups:—

III. PLUMOSÆ—*Plume-branched*;

IV. EDULES—*True Nut Pines*;

V. PARVICONÆ—*Thimble-cone Pines*.

GROUP III. PLUMOSÆ—PLUME-BRANCHED PINES.

Branchlets plume-like, outreaching, or descending, bearing pendent near the ends the small oblong or elliptical cones; leaves in fives. Two species:—

6. *Balfour Pine* (*P. Balfouriana*).—Very rare trees of limited numbers, sequestered on certain slopes of Mount Eddy, near Mount Shasta, and upon the slopes of Mount Whitney and neighboring peaks; cones narrowly elliptical, three to four inches long, the scales comparatively soft, the prickles minute.

7. *Foxtail Pine* (*P. aristata*).—Similar, but larger trees, on the highest mountains of Nevada, Southern Utah, Colorado, and southward to New Mexico and Arizona, with a few on the Panamint Mountains of Southeastern California; cones smaller, nearly cylindrical, the scales harder, with slender, half-inch, bristle-like prickles.

GROUP IV. EDULES—TRUE NUT PINES, OR PIÑONS.

Natives of hot interior regions, from Nevada and Colorado to Sonora. Trees rounded in outline; the foliage heavy-scented; leaves in fascicles of one to five, are white-lined above with *stomata* (breathing pores); cones small, globose, stemless, hence promptly crowded off at maturity; cone-scales widely opening at maturity, are few in number, the umbo usually very protuberant, but devoid of prickles; seeds large, wingless, edible. Four closely related species in two pairs—American and Mexican:—

1st Pair. American Nut Pines.

Largest of the nut pine trees; cones slightly elongated, one to two inches long; seeds soft-shelled. Two species, so closely connected that some observers think them forms of one species, and in that case they bear the name of the first mentioned below.

8. *Single-leaf pine* (*P. monophylla*).—Usually small, round-headed trees, but in the Tehachipi Mountains becoming tall and slim, thirty to fifty feet high, with a diameter of two to three feet; headquarters on the mountains and hills of the Great Basin, they reach the foothills of the Southeast Sierra, extending sparsely southward to the mountains of Southern California, and eastward to northern Arizona; cone largest of the nut pines, one and one half to two inches long, the scales with large quadrangular umbos, one quarter to three eighths inches high; peculiar for its robust, sharp-pointed leaves, which are usually solitary, yet always, while young, sheathed at base like a fascicle.

9. *New Mexican Piñon* (*P. edulis*).—Very small, globe-headed trees, only a few feet high, on the plateaus of New Mexico, extending sparsely northward to Colorado, westward to Arizona, and southward to western Texas; leaves very slender, in twos; cones smaller, the axis so short that when the cone opens it becomes a flat rosette, scales with less prominent umbos. The soft-shelled delicious seeds are a staple article of diet for the natives, and many tons are exported annually.

2d Pair. *Mexican Piñons.*

These species, though composed of similar, small, rounded trees, differ materially in habitat and in the leaves and seeds.

10. *Parry Nut Pine* (*P. quadrifolia*, until recently called *P. Parryana*).—Trees with cones one to two inches long, the umbos very prominent; seeds soft-shelled; the leaves, at first thought to be in fours, are mostly in fives, and very robust; headquarters on the San Rafael Mountains of Lower California, extending sparsely northward into the mountains back of San Diego.

11. *Stone-seed Piñon* (*P. cemproides*).—Small trees of Northern Mexico, extending sparsely into Arizona; cones very small, opening like those of *P. edulis*, an inch thick, scales few, with slightly elevated umbo. Trees peculiar for their large, hard-shelled seeds, forming a popular Mexican diet. The leaves are very slender, and mostly in threes.

GROUP V. PARVICONÆ—THIMBLE-CONE PINES.

Usually small trees; the cones often persistent for many years, very small, one half to two inches long, slender, narrowly elliptical until opened, and armed with small incurved prickles; seeds very small, narrowly winged; leaves in pairs. Two closely-allied species, by many observers considered as one, and in that case called by the name of the first species following.

12. *Twisted Pine* (*P. contorta*).—Often small, scrubby, wind-depressed trees, on the northwest coast, the southernmost at Mendocino, often attaining a height of thirty to fifty feet, with a thick-barked trunk, two to three feet; extending northward, with smaller forms, to Alaska, and, it is thought, eastward to Idaho and Montana; cones varying from one half inch long in Alaska to one and one half inches in lower latitudes. A dwarfed form on the Starved White Plains, near Mendocino, begins to bear at one foot high.

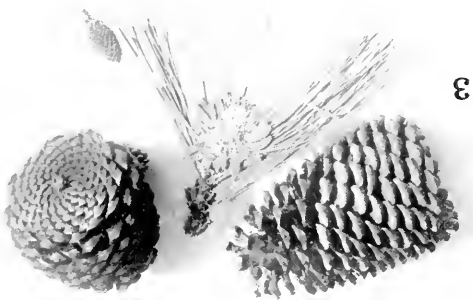
13. *Tamarack Pine* (*P. Murrayana*).—Usually slender trees, of sub-Alpine, wet places, found especially northward in the mountains of Oregon, Washington, Idaho, Montana, and British Columbia, where it is often called "Lodgepole Pine," but southward on the Sierra of California, becoming large trees, three to five feet in diameter, though the hard, outer bark will be but one quarter to one half inch thick, resembling that of Eastern and Old-World Tamarack. Smaller forms also in the highest mountains of Arizona to northern Mexico. Wood singularly light-colored; cones larger, one and one half to two and one half inches long.

Sub-section B. Fracticonæ—Broken-cone Pines.

Usually large and valuable lumber trees, of wide distribution; cones ovate-conical, four to eight inches long, peculiar for the manner in which they break away from the limb by an irregular transverse fracture within the base, leaving the undeveloped scales on the limb; seeds with long wings, widest above; leaves mostly in threes, five to eight inches long. Two groups:—

GROUP VI. COMMUNES—COMMON LUMBER PINES.

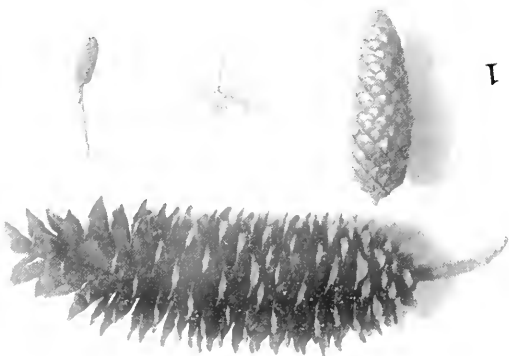
Large trees of middle altitudes, from British Columbia southward, on the principal ranges, to Arizona, eastward to the Black Hills of North Dakota. Two species:—



Black Pine—*Pinus jeffreyi*.



2. Yellow Pine—*Pinus ponderosa*.



1. Sugar Pine—*Pinus lambertiana*.

CALIFORNIAN PINE-CONES.

From photographs by John G. Lemmon.



14. *Western Yellow Pine* (*P. ponderosa*).—Trees of the largest size, attaining on the Sierra a height of 200 to 300 feet, with a diameter of ten to fifteen feet; bark in the typical form, yellowish or whitish, mostly very thick and deeply fissured into large, longitudinal plates; cones conical-ovate, three to five inches long; male flowers flexuous, and peculiar for their great length, three to five inches long, forming large rosettes about the bud or the few leaves at the ends of the male branchlets. One of the "polymorphous" species, probably divisible into several. One form (variety *nigricans*), with dark brown bark, which is thinner and more finely checked; the trees smaller, sap-wood of many layers; the limbs usually retained longer than those of the yellow-barked trees—is found bordering the yellow pine forests of the Sierra; and southward, on the Colorado plateau of Arizona and New Mexico, it forms the most of a large pine forest. A second well-known form, in my opinion, is entitled to rank as a good species, to wit:—

15. *Rocky Mountain Yellow Pine* (*P. scopulorum*). *N. Sp.*—Small trees, spire-like in outline, with grayish bark, and with smaller cones and harder scales; the foliage more scanty, leaves inclined to be tufted near the ends of the branchlets, usually in threes, but often in twos. Mountains of Colorado, westward to Nevada, and eastward to the Black Hills of North Dakota.

16. *Black Pine* (*P. Jeffreyi*).—Large trees, affecting, usually, more elevated localities than *ponderosa*; bark dark brown, finely broken into small squares; limbs long and spreading; young branchlets and leaves when bruised exhale a pleasant orange-like fragrance; cones large, ovate, six to ten inches long; umbo prominent, with strong, recurved prickles; seeds large, with expanded wings, one half to one inch long; male flowers robust, short, one to two inches long. Western Montana, through Idaho and Oregon,

southward to California, along the Sierra, to the mountains of Southern California; perhaps to Lower California, but the type there (variety *Peninsularis*) forming a large forest on the San Rafael mountains, of spire-shaped trees, with thick, coarsely checked bark, the cones large, very abundant, with hard, dark-colored scales; leaves large, eight to twelve inches long; bud-scales scarious, lacerate, with whitish hairs—may be entitled to specific rank.

GROUP VII. NOVITATES—ARIZONA BROKEN-CONE PINES.

Two little-known species on the mountains of Southern Arizona and Northern Mexico.

17. *Arizona Pine* (*P. Arizonica*).—A middle-sized tree; attaining forty to sixty feet, on the highest peaks, from the Santa Catalina Mountains southward to Chihuahua. Peculiar in having its leaves in fives.

18. *Broad-leaf Pine* (*P. Mayriana*, until recently *P. latifolia*).—Medium sized trees, with leaves and bud-scales similar to those of the Peninsular Pine; cones ovate, oblique, three to five inches long, the scales with recurved mammillary umbos, tipped with slender prickles. Santa Rita and Huachuca Mountains of Arizona. Perhaps includes the form on the Chirricahua Mountains (*P. Apachecca*), with smaller cones, and fewer scales, the apophyses of the cone-scales prominently elevated, but not recurved, the umbo quadrangular, armed with a stout prickle.

SECTION TWO. LATERALES—LATERAL-CONED PINES.

Cones and male flowers arising laterally, i. e. along the growing stems at some distance below (later than) the first leaves of the season; cone-stems very strong, aiding in retaining the cones, often for a long period, on the trees. Six species in two groups, the Heavy-cone Pines and Persistent-cone Pines.

GROUP VIII. GRAVICONÆ—HEAVY-CONED PINES.

Cones of the heaviest and hardest description, usually in whorls or circles of three or more, with thick, stout stems, two, four, or even six inches long. Although the cones usually open at maturity, releasing the very large seeds, they remain on the tree until forced off by the growth of the bark and wood after the lapse of four to eight years, according to length of stem.

19. *Torrey, or Lone Pine (P. Torreyana)*.— Limited to a few, sturdy, storm-beaten trees on the beach, twenty miles north of San Diego (with a few more on the outlying Santa Rosa Island). The cones mahogany-brown, hard as knobs of hickory, persisting for about four years, are nearly hemispherical, with few broad scales, bearing very hard-shelled seeds, three fourths of an inch long and half as thick — the largest known; the wing abbreviated to a thick clasping pair of clips holding the seed. Peculiar for these characters of the cone and seed, and for the great size of its leaves, which are always in fives, and eight to twelve inches long.

20. *Big-cone Pine (P. Coulteri)*.— Trees of medium size, with long spreading branches, the branchlets of the season very stout, to support the immense cones; these elongated, elliptical, of matchless size and weight, fifteen to twenty inches long, and often attaining eight to ten pounds; the scales are very large and thick, the umbo greatly enlarged, and with its long, stout, curved spine, becoming a stout hook; the hooks on the outer side, near the base, being two to four inches long. Seeds half an inch long, with very large wings, an inch long; foliage dark green, abundant, the leaves in threes, large and long, ten to sixteen inches. On the southern coast mountains, from San Luis Obispo east to San Bernardino, and south to highest peaks near San Diego.

21. *Gray-leaf Pine* (*P. Sabiniana*).—Usually small, round-headed, freely-branching trees of the hot interior foothills bordering both the Sierra and Coast Mountains, from Shasta to Southern California, eastward to near Yosemite; the scant foliage of a striking grayish color, leaves in threes, all but those of the season drooping or early falling; cones dark brown, broadly ovate, weighing two to five pounds, armed with stout, short hooks, one half to two inches long; seeds, as in the Torrey Pine, very large, with a thick, hard shell. Peculiar for the light-colored foliage, the trees resembling clouds or fog banks in the distance.

GROUP IX. TENACES.—PERSISTENT-CONE PINES.

Completing the many groups of pines is the quartette of Tenaces, those small trees whose cones are produced annually in circles about the stems (or singly in the last species), mostly not falling at maturity, but remaining fastened by their stems to the tree, also generally remaining closed for a long period. Most familiar is the,—

21. *Monterey Pine* (*P. radiata*).—Indigenous to the Monterey coast, but popular in cultivation. The trees are peculiarly marked by characters of the oblique-ovate cones, whose scales at base, on the outer side, swell out into nearly hemispherical tubercles, or knobs, one quarter to one half inch high. The cones are generally held fast by the tree during its life; trees four and five feet in diameter may be seen on Point Pinos, still retaining every cone they have produced, circling the trunk and limbs from base to apex. Of course, the lumber is perforated with holes,—the channels formed by the cone-stems on their many years' journey from heart to bark.

22. *Swamp Pine* (*P. muricata*).—Small trees in scattered groves, often in wet places along the coast from Lower California to Mendocino, where it becomes a tree similar in

appearance to the Monterey Pine, but with excessively thick bark for trees of its size, four to six inches thick on trees but eighteen inches in diameter; cones small, oval, two to three inches long, armed with strong, sharp prickles. A peculiarity is in the leaves, which are in pairs, though very long, four to eight inches.

23. *Knob Cone Pine* (*P. attenuata*).—Usually slender trees, in groves scattered on sunny slopes, from Idaho to Southern California; cones narrow, four to seven inches long, in whorls, or circles, generally declined, often incurved, attenuate toward each end, outer scales with conical, quadrangular protuberances, and short prickles. A peculiarity of this tree is the tapering character of its cones at base, whereby they oppose so little resistance to the growing trunk that often, instead of being crowded off, they are seized by the first encroaching wood-layers, and finally enveloped completely. Examples may be seen in the Berkeley arboretum.

25. *Chihuahuah Pine* (*P. Chihuahuana*).—Small, often decrepit, trees of Southern Arizona and Northern Mexico; leaves in threes, slender, three to six inches long, whitened above, the sheath of long, shining, loose, soon-falling bracts; cones (requiring three years to complete growth) small, top-shaped, one and a half to two inches long, persistent for many years. This tree is peculiar in America for its three-year cones, and among the Laterales for the promptly deciduous sheaths of its leaves.*

[GENUS CEDRUS.—TRUE CEDAR.

Historic trees of the Orient, known by their few, large, long-spreading branches, dense foliage of short, one half to

* The only other three-year pine is *P. pinca*, the Stone Pine, the classic pine of Greek and Roman writers, a small, round-headed tree, much in cultivation, with its long leaves in pairs; cones large, ovate, five to six inches long, mahogany-colored, the thick scales with rounded umbos, and large blue seeds.

two-inch leaves, mostly in tufts of thirty to sixty, on short spurs; cones biennial, erect, large, nearly cylindrical, two and a half to four inches long, with many close-packed smooth scales. Three species, often met with in cultivation. The salient characters of the true cedars are here mentioned, that they may be compared with those of the so-called cedars of America.]

CLASS B. DECIDUÆ.—THE DECIDUOUS-LEAVED
FASCICULARS.

Trees with small, slender leaves, mostly tufted on the ends of short undeveloped spurs, peculiar for being promptly deciduous; hence, the trees are naked for a large portion of the year. Cones, maturing in one season, are small, narrowly elliptical, one to two inches long, pendent from the sides of the previous season's growth. Two genera, *Larix* and *Pseudolarix*. The former only represented in America.

SECOND GENUS. LARIX.—THE LARCH.

In America, usually small trees, called by the aboriginal name of Tamarack. Two species of the far northwest.

1. *Western Larch* (*L. occidentalis*).—Often attaining a large size, eighty to one hundred feet high and three to four feet in diameter. This species is scattered through the Selkirk and Gold ranges, and southward sparsely on the Rocky Mountains, and the Cascades to Mt. Hood. Peculiar for its very thick, spongy bark, resisting the first kindling of forest fires.

2. *Woolly Larch* (*L. Lyallii*).—Small Alpine trees, rare in the northern Rocky Mountains, westward to the Galton and Cascade ranges. Cones deciduous, and with the branchlets clothed with whitish hair.

(Concluded in next number.)

GENERAL CLASSIFICATION OF THE PACIFIC SLOPE CONIFERS.

ORDER CONIFERÆ—CONE-BEARING TREES.

DIVISION I. SPIRALES—SPIRAL-
CONED CONIFERS.
Leaves and cone-scales in spirals.

TRIBE 1. ABIEÆ—
Northern Pitch Trees.

FASCICULARIÆ.

{ Evergreen. {
{ Deciduous. {

1. *Pinus* Pines.
(*Cedrus*. True Cedar—Oriental.)
2. *Larix* True Larch.

SOLITARIÆ.

{ Pendentes. {
{ Erectes. {

3. *Picea* True Spruce.
4. *Tsuga* Hemlock Spruce.
5. *Pseudotsuga* False Spruce.
6. *Abies* True Fir.

TRIBE 2. ARAUCARIÆ.

{ Southern {
{ Pitch Trees. {

(*Araucaria*, etc.) Norfolk Island
Pine, etc.

TRIBE 3. { TAXODIÆ THE
{ TAXODIADS.

{ Pygmææ. {
{ Gigantes. {

(*Athrotaxis*, etc.) Tasmanian.
(*Taxodium*—Bald Cypress.)
Atlantic and Mexican.
7. *Sequoia* Redwoods.

TRIBE 1. { CYPRESSES AND
{ ALLIES.

{ American. {
{ Cedars. {
{ Cypresses. {

8. *Thuja* Arbor Vitæ.
9. *Libocedrus* Incense Cedar.
10. *Chamaecyparis* Cypress.
11. *Cupressus* True Cypress.

TRIBE 2. TRUE JUNIPER.

12. *Juniperus* Juniper.

ORDER TAXACEÆ—DRUPE-
FRUITED TREES.

{ 13. *Tunion* Nutmeg.
{ 14. *Taxus* Yew.

GENERA,

On Pacific Slope, numbered.

CONSPECTUS OF PINES, LARCHES, AND CEDARS.

SUBTRIBE A. FASCICULARIÆ—FASCICLE-LEAVED CONIFERS.

Pine, Larch, and Cedar.

1ST GENUS. PINUS—THE PINES. Leaves in fascicles of two, three, or five.		SUBGENUS I.—STROBUS. Soft or White Pines.		FINAL GROUPS.	SPECIES.
SUBGENUS II.—PINASTER. Hard-wood Pines.	TERMINALES. Cones Subterminal.	LATERALES. Cones Lateral.	FRACTICONEÆ. Broken-cone.	1. Long-cone Lumber.	{ 1. <i>Lambertiana</i> . Sugar Pine. { 2. <i>Strobiformis</i> Mexican White Pine. { 3. <i>Monticola</i> . Mountain White Pine.
				2. Alpine Pines.	{ 4. <i>Flexilis</i> . . . Rocky Mt. White Pine. { 5. <i>Albicaulis</i> . . . White-bark Pine.
				3. Plume Pines.	{ 6. <i>Balfouriana</i> Balfour Pine. { 7. <i>Aristata</i> . Foxtail Pine.
				4. Nut Pines or Piñons.	{ 8. <i>Monophylla</i> . One-leaf Pine. { 9. <i>Edulis</i> New Mexican Piñon. { 10. <i>Cembroides</i> Stone-seed Piñon. { 11. <i>Quadrifolia</i> .. Parry Pine.
				5. Thimble-cone Pines.	{ 12. <i>Contorta</i> .. Twisted Pine. { 13. <i>Murrayana</i> Tamarack Pine.
				6. Common Lumber.	{ 14. <i>Ponderosa</i> . Western Yellow Pine. { 15. <i>Scopulorum</i> Rocky Mt. Yellow Pine. { 16. <i>Jeffreyi</i> . . Black Pine.
				7. Arizona Lumber.	{ 17. <i>Arizonica</i> . . Arizona Yellow Pine. { 18. <i>Mayeriana</i> . . Broad-leaf Pine.
				8. Heavy-cone Pines.	{ 19. <i>Torreyana</i> .. Torrey Pine. { 20. <i>Coulteri</i> . Big-cone Pine. { 21. <i>Sabiniana</i> . Gray-leaf Pine.
				9. Persistent-cone Pines.	{ 22. <i>Radiata</i> .. Monterey Pine. { 23. <i>Attenuata</i> .. Knob-cone Pine. { 24. <i>Mucronata</i> . Swamp Pine. { 25. <i>Chihuahuana</i> Top-cone Pine.
				10. Heavy-cone Pines.	{ 26. <i>Occidentalis</i> .. Western Larch. { 27. <i>Lyallii</i> . . Woolly Larch.
TUFT-LEAF CONIFERS.	20 GENUS. LARIX—LARCHES. Deciduous-leaved.				{ <i>Atlantica</i> . African Cedar. { <i>Libani</i> . . . Lebanon Cedar. { <i>Deodara</i> .. Indian Cedar.





BULLFROG LAKE.
From a photograph by J. N. Le Conte.

UP AND DOWN BUBB'S CREEK.

BY HELEN M. GOMPERTZ.

[In this short account of a summer outing, there is little room for details. We took such food as was easily packed on burros, nevertheless allowing ourselves some of the best canned fruits and vegetables, by way of variety.

If there be room in the pack, onions, potatoes, and desiccated soups are easily carried.

Any information about the quantity of food, or about suitable clothing, can best be given to any one interested in a similar trip upon addressing me at Berkeley.]

A walk of thirty miles from Millwood, Fresno County, brought us to camp under the shadow of "The Grand Sentinel," in King's River Cañon. Blocking the upper end of the cañon stands Glacier Monument, obstinately rearing its stately pyramid in the background of every river scene. One might as well expect to see Sahara without its pyramids, as King's Cañon without the monument. The party, numbering Mr. J. N. Le Conte, Mr. and Mrs. W. S. Gould, the Misses Miller, and myself, stayed long enough in the cañon to take short trips to points of interest: up Paradise Cañon, to the top of Grand Sentinel, and to the summit of Goat Mountain (12,500 feet). Others have already called attention to the fine panoramic view of the whole Sierra uplift from this peak, and our subsequent trips to higher mountains in no wise interfered with the verdict that the Goat Mountain view is unsurpassed in its kind. It is within such easy reach of the cañon, that all should make the ascent.

On our return from a three days' trip to this mountain, we spent some time in considering the weighty question of

how to make our packs light enough for two small "burros" to carry up Bubb's Creek. Our supplies had been brought in by pack train, and now the problem was, to take enough for a two weeks' stay. To economize in weight, down quilts and light blankets were found very suitable. As to other baggage, if one be a woman, she will feel a glow of pride in the thought of doing her best to rough it, whilst she packs into a bag things that seem impossible to be without. This is a safe way of bestowing them, because at the last moment a handful of anything will be snatched from the top, and the rest left behind in the bag. Strange to say, no afterglow of satisfaction follows this sacrifice.

But like war-horses that scent the smoke of battle from afar, the dust of Bubb's Creek trail lured us on, and all small vexations were forgotten in the pleasure of viewing the unfolding beauty disclosed at every turn of the narrow gorge. Its sides were bare and precipitous, but the dark polished surface served as a foil to the tumbling white torrent, whose playful leaps gave small hint of the force that had worn for it its way into the very heart of the rock. Not a good word can be said for the trail that climbs along this rocky wall, but in deference to my readers, the bad ones will be omitted. Our route followed the old Independence Trail, up Charlotte Creek to Lake Charlotte. Before reaching the latter, a stop of one day was made for the ascent of Mt. Gardner (13,200 feet).

The climb was begun from an altitude of 8000 feet, just behind Granite Dome, and proved to be quite easy to the lower summit of the double peak. It was a most impressive moment, when, having climbed slowly and laboriously over a steep boulder mass, we suddenly came to the top, and looked over the sheer, dark cliff, a depth of 1500 feet. For days we had looked up at its frowning wall of cold, gray granite, and now to be leaning over its edge and gazing down its awful depth seemed a triumph indeed. The great



SUMMIT OF MT. GARDNER
From a photograph by J. N. Le Conte.



UNIVERSITY PEAK.
From a photograph by J. N. Le Conte.

cliff forms a re-entrant angle, and we stood on one side of the angle, looking across at the true summit on the other side. Here we met Professor Brown, who followed Mr. Le Conte on to the summit. They found that the north side of the mountain also fell away in a sheer cliff, so that they must cross a sort of "knife-edge" to gain the topmost point. To those watching there came a moment of dreadful anxiety, when, the "knife-edge" safely passed, the climbers disappeared behind a huge square rock. For at that same moment an unseen boulder crashed down the mountain side, and who could say that our friends were not carried with it? In a few moments, lengthened into hours by suspense, they re-appeared, and this time on the hitherto untrodden summit of Mt. Gardner.

Miss Belle Miller followed them, creeping, step by step, along a narrow ledge on the face of the cliff. When she reached the "knife-edge," which, to increase the danger of crossing, dipped down at a considerable angle, she paused, and wisely went no further. She was then but a few feet below the summit, and deserves the credit of having dared thus far. For myself I reserved the harder (?) task of watching one after another of my friends in such perilous positions. From my post of observation, they seemed to be clinging, like flies, to the cliff itself, and my fears for their safety increased with each step that bore them further from me.

Presently, Miss Miller returned, and together we watched the others hurl down a boulder or two, in order to place the tripod firmly. The tiny space thus cleared gave room for nothing but the camera, and every time that the shutter was to be adjusted, or the cap removed, Mr. Le Conte had to crawl through, between the tripod legs, and back again. This acrobatic performance reminded us forcibly of the man of whom it was said, that "he crawled through himself, swallowed himself, and smiled with the greatest agility."

Far and near stretched a veritable sea of mountains, their sharp crests overtopping the general mass in long wave-like lines. Toward the southwest a tiny white cloud appeared, and from that grew an ominous black one, that shrouded Mt. Brewer in its folds. From our sunny eminence, we watched the storm burst and show glimpses of that weather-beaten summit upon which we yet hoped to stand. As time passed, the blackness fell over us, too, and all unwillingly we heeded the warning of each approaching thunder-clap. Plunging down the mountain side, we were soon in the midst of a smart hailstorm. It being too near the summit for shelter, we kept on our way, and in an hour or two had walked ourselves dry, and found our way again into the land of summer.

Speaking of summer, calls to mind the current saying, that at this season it never rains in the Sierra. In the present case the frequent thunder showers were much enjoyed, but we soon found it convenient to organize a storm brigade, that should put all things under cover before the first big drops had fairly fallen. Then we ourselves would seek shelter under some big fir-tree, and from beside a huge camp-fire watch the war of the elements. But when it fell to raining a dull, steady downpour, the seat of war was changed. Our wrath rose with the floods, and when night brought no cessation, it was far from soothing to lie under a rubber blanket and listen to the patter of the raindrops. When the blanket seemed to be getting heavy, the monotony was varied by draining off the numerous lakes formed in its depressions, and trying it again. Of course, it was camp etiquette to declare that one had slept like a log all night. But at this safe distance, in time and space, I may say, that "water-logged" would have described our condition better.

A day or two later found us camped at the foot of University Peak, just west of Kearsarge Pass. A stormy

day was followed by an evening calm, and then it was our good fortune to see the sunset light redden the sharp pinnacles which formed the western spur of the dominant peak. We watched the jagged reflections in the chain of gem-like lakes at their base. Not a ripple marred the mirror calm of the water. It glowed with colors—amethyst, violet, deep purple, and then grew black and starry with the sky—a good omen for the morrow's climb to University Peak.

At dawn we were breakfasting on rainbow trout and cornmeal dodgers. This important ceremony over, we set our faces toward the east, where our Mecca rose in bold outline against the clear morning sky. The day before, we had viewed it from Kearsarge Pass, whence it shows a forbidding cliff, which seems fairly to overhang and guard this gateway to the east.

From the west, however, our way led over rough talus piles at the foot of the pinnacles, past a little frozen lake, then across some snowfields, onward, up a steep slope of coarse, loose, disintegrated granite, mixed with boulders of various sizes. These, as well as the sand, were set in motion at the slightest touch, and, much to our dismay, each upward step seemed to carry us downward. With much murmuring and vexation of spirit, we finally reached the notch in the pinnacles at which we had been aiming, and after that, finding the slope much gentler, it was easier to keep one's footing. We had now skirted the mountain to its southern face, quite opposite to the precipice. The sky was cloudless, a cool breeze blowing, and although we stopped often to rest and to enjoy the prospect, we yet reached the top quite easily.

We were now at last on the main crest of the Sierra. From an elevation of 13,900 feet we looked down the eastern face of the range into Owen's Valley, 9000 feet below. Anon we traced the crest-line, from Mt. Goddard on the

north to the Whitney region on the south. Mt. Williamson lay near us, Mt. Tyndall further south. Between us and Williamson was a lofty mountain yet unnamed, to which we gave the name of Mt. Keith, in honor of Mr. William Keith.

After many days of seeing nothing but mountains, we could turn, with a feeling of enjoying a new sensation, to look upon the wide valley far below. A wavy line marked the Owen's River; a dark shadow, the trees and town of Independence. So clear was the atmosphere, that two elliptical forms faintly traced on the plain we made out to be the race tracks near the town. We had heard much of the "White Sage Honey" of Independence, and, after noting the tracks, quite hoped to see the beehives, and hear the "drowsy hum of insects."

With a turn of the glance, all these petty worldly things were put aside, and we were again amid our wild accustomed haunts. Thirty beautiful lakes were counted from this point, some shining out of carved bowls on high rocky shelves, others nestling in the green hollows below.

Mt. Brewer, crowning the Great Western Divide, bared its snowy bosom to the sunshine. Bathed in light, it no longer looked forbidding, but lay beyond us like "the promised land."

Before leaving the summit, Mr. Le Conte built a small monument, and left beneath it a can containing the names of the members of the party; also an account of the naming of University Peak, in 1890, by a party of California students, who viewed it on its inaccessible side from Kearsarge Pass. The ascent here recorded is supposed to be the first, and was made on July 12, 1896.

In the course of conversation, I once heard Mr. John Muir remark, that he disliked to waste a starry night in sleep when he might be, instead, on the mountains. I now recall the strong desire I felt to stretch myself on the warm

rocks and spend the night on the summit. But I can lay no claim to having done more than *desire* it, for the thought of a good dinner and one of Mr. Gould's inimitable campfires, soon sent us clambering down the boulder pile and speeding along the slopes, glad that at each step we slid down quite a little distance nearer home. The next day, being Monday, we devoted to fishing, cooking, and mending.*

With many camping parties the subject of the menu is a vexed question. We found that the succulent flapjack and the filling corndodger palled at times upon our jaded appetites; so, armed with a supply of Magic Yeast, and trusting to our Dutch oven, we dared the mysteries of real bread. Perhaps it was the "magic" in the yeast that crowned our efforts with success, but be that as it may, housekeepers will appreciate our daring when they remember that we were camped at a considerable altitude, and had to contend with frequent changes of temperature, besides thunderstorms of several hours' duration. I recall my first attempt at camp bread with mingled emotions. Early one bright, hot morning, I mixed my "sponge," and wrapping the basin tenderly in a heavy, red blanket, set it to rise, in a sunny place among the rocks. I moved it with the sun, and peeped under the red blanket to see if the dough had commenced to work. But no bubbles showed on the surface, and I despaired of ever seeing it rise. Later in the day a splendid thunderstorm broke over us. The bread must be kept warm at all costs. I had heard that the Russian peasants took theirs to bed with them, but having no bed to take mine to, I doubled the red blanket and placed the unleavened mass in the warm ashes near the campfire. Thoroughly disgusted with the results of my

* In the afternoon, Mr. Gould and Mr. Le Conte climbed a fine peak north of Kearsarge Pass. Two days before, they had also made the ascent of a mountain to the south of Lake Charlotte, which gave a fine outlook toward East Lake and Mt. Brewer.

labor, I gave myself up to enjoyment of the storm. Judge of my surprise when, some hours later, it was discovered that the bread had risen! It was near nightfall, but that bread must be kneaded, set to rise again, and baked before we "turned in." The baking was usually done by Mr. Le Conte, whose skill in manipulating a Dutch oven is only equaled by his dexterity in "flipping the flapjack." Finally, when the crisp brown loaves were turned out, and our nostrils assailed by their delicious odor, no trouble seemed too great for the result.

Necessity caused us to devise various modes of cooking the scant variety of staples at hand, and though we cannot boast of ascending mountain peaks before breakfast, we can recall with pride the savory surprises that Mrs. Gould hid under cover of the Dutch oven, and which to our uninitiated minds seemed quite as difficult to attain as the mountain tops. I cannot leave the subject of our larder without telling how it was once replenished when supplies ran low. Of course, as loyal Sierra Club members, we despised the sheep and the sheepmen, but being further instructed, we learned not to scorn the advent of a "stray sheep," which it was our bounden duty to shoot, in order to save it from the hungry bear.

One morning, after we had left a beautiful camp on Bullfrog Lake and made our way down Bubb's Creek, we walked along in single file, seeking "whom we might devour." Suddenly, the man in the lead passed the word along, "A stray." He turned upon us a beaming countenance, whose expression quickly turned to one of consternation. These two conditions were experienced by each of us in turn, when, on surmounting a slight rise of ground, we beheld not only the "stray," but also a man, presumably the herder. Visions of broiled chops and roast legs which had danced before our eyes vanished all too soon. But stay,—a bright thought—we would *buy* some mutton, although it could never have the wild flavor a "stray"

might have had. We proceeded to parley with the supposed herder, and as we approached him our wonder grew, for we had never seen his like before—not among herders. Suffice it to say, that he proved to be a traveler like ourselves, and willingly aided us to secure the “stray.” Thus did we prey upon the beasts of the wilderness and send some poor bruin supperless to his lair.

Our creature wants supplied, we pushed slowly down a very rough trail, along this branch of Bubb's to its confluence with the main stream. We never could get away from the “ubiquitous Bubb's.” Here Mr. Gould and Mr. Le Conte were obliged to fell a tree and bridge the stream. On this we crossed, they making many trips back and forth with the pack, while the burros swam gallantly over. In the early part of our trip, we had many a tug-of-war with these obstinate animals, but much experience had made them wise in their latter days.

Next morning our line of march was toward East Lake, from which we proposed to make the ascent of Mt. Brewer. It was slow work, there being no trail, each sheepman having “monumented” the way he liked best. We soon found it necessary to disregard the monuments and send a scout ahead to search out the safest way for our animals. The best part of the morning was spent in reaching camp at the head of the lake, and on the morrow we were to make the last and, as we then thought, the most difficult ascent. *

The event proved a longer climb than to University Peak, but it was more quickly traveled, because of the absence of steep slopes covered with shifting sand. One had only to take heed that the hobnails did not slip on the highly polished slabs of rock. We noticed great fields of glaciated granite, which bore a soft pinkish-gray tinge, while that lacking the polish showed a colder, whiter hue. Further up began a great clambering and scrambling over huge tilted blocks of granite, and what with rolling rocks

down the steep snowfield and taking photographs, it was eleven o'clock before we reached the top. We had enjoyed the exercise of every muscle in the body for the last hour or two, and were now content to stretch out and rest. We recalled Clarence King's account of his ascent from the south side of the mountain, and of his making for that little, perilous notch on the divide. Suppose we had been the first to come up this way, how hopeless the tangle of mountains, ridges, and cañons would have appeared !

A thunderstorm now began to rage over Bubb's Creek, while to the south dazzling white clouds floated above Table Mountain. Further off, Mt. Whitney reared its proud helmet, flecked with snow, and southward the Kaweah group beckoned us on. What more could heart desire in the way of variety and grandeur ?

Mr. Le Conte had told us that on his first visit to the mountain the summit was deep under snow, but on this day it showed a very different aspect, and but few patches remained between the rocks. We leaned over the cliff to watch the rocks that were hurled from the edge strike against the side and bound far out into the air, only to be gradually drawn toward the mountain mass again ; then, leaping over the crevasse, they rolled swiftly over the snowfield. Then, less swiftly, less, and less so, until they turned over gracefully and lay down in a soft, white bed, as if weary with the long descent.

While scrambling about the summit, just where the snow had recently melted, Miss Estelle Miller had the good fortune to find the long buried record left by Professor Brewer in 1864. This rather romantic incident, linking us to the past, gave an added charm to our visit to Mt. Brewer, and really made this day the culmination of all that had gone before. We could now conjure up Professors Brewer and Gardner taking leave of Clarence King, and from this very summit, overlooking his route to Mt. Tyndall. We won-

dered whether even *they* had had storm, sunshine, and dazzling cloud to enhance the wild beauty of the scene.

So much does my imagination love to dwell upon this hour that I cannot choose but let our little party go down to camp and then back to civilization without the aid of my pen, while I luxuriate a little longer in the sunshine of these barren solitudes, which, nevertheless, are filled with arrested motion, ready to burst forth into life at the touch of the Master's hand. * * *

Upon our return to Berkeley, it was our great pleasure to meet Professor Brewer, who happened to be in California on the United States Forestry Commission. Mr. Le Conte showed him all the photographs taken during our trip, including the one of the precious paper which he had long ago left on the summit of Mt. Brewer.

In an exceedingly interesting reminiscence of his ascent, he related that he had never until that day met but one person who had climbed the mountain. His meeting with the exceptional one was in this wise:—

Some years ago, upon visiting Mammoth Cave, Kentucky, he wrote his name in the visitors' book, and was followed by an Austrian gentleman, who, on seeing the name, came to him and asked if he were the Brewer who had made numerous ascents in the California Sierra. Professor Brewer replying in the affirmative, the stranger wrung his hand with enthusiasm, and gave a spirited account of his own ascent of Mt. Brewer, some ten years ago. He had seen the record in the bottle, but being a passing traveler, his discovery was not known to Californians.

I quote Professor Brewer further in saying, that in the course of the Survey of 1864, he and his companions crossed and recrossed the Sierra fourteen times! Surely that is an experience worth looking back upon over the stretch of a lifetime. That this is Professor Brewer's verdict, can but enhance for us the value of our own brief wanderings.

WANDERINGS IN THE HIGH SIERRA, BETWEEN MT. KING AND MT. WILLIAMSON.

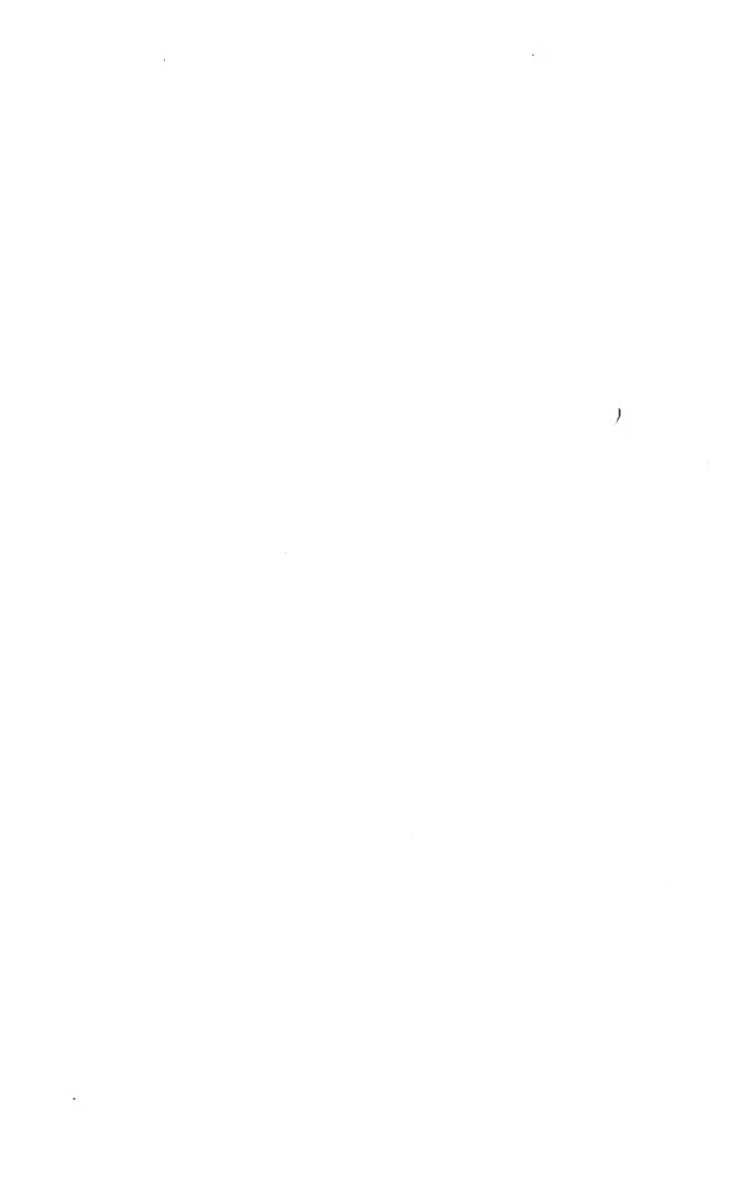
BY BOLTON COIT BROWN.

PART II.

Having roughed it for three weeks, we now proposed to give ourselves the fun of making a really proper camp. We selected a beautiful spot among a grove of white oaks, twenty minutes above the ford in Paradise Valley, and proceeded to camp as you ought to camp. We made a fine table of a remarkable granite slab, with seats to match, and a shelf to hold the water-pail. Also, we built a wonderful stone stove, with a patent draught, which worked as no camp stove ever worked before. Then we made a beautiful wood-pile with the sticks all of a size and of just the right kind. We made a kind of leaf-covered roof over the bed, after which no rain fell. We arranged a place to wash dishes, and one to take baths in at the river, and put a regular cut-out trail down to them. We constructed an "elevator" with platform and rope, by which to hoist the eatables into the trees, out of reach of campers' horses and of bears. For, in this cañon, according to an old fellow with a rifle whom we met one day, "you can get a bear-fight most any time." And indeed, shortly before our advent, a party of ten from the Stanford Camp, two miles below, mostly ladies, wearing big hats with mosquito netting over them, took a stroll up here, and some three hundred yards above came face to face with a grizzly bear. He was described as "belt high," coming along the trail toward them, swinging his head from side to side. For

Looking down
Paradise Cañon,
and across Kings River
Cañon. Drawn from
nature by B.C. Brown.





the story's sake, it is too bad the bear merely turned around and went back up the trail. Professor Kellogg, who was leading the procession, pronounced it a grizzly, and John Fox says he knew there was one up there somewhere. He thinks it is the last one, and speaks lightly of him as "Old Club-foot." But Fox can afford to be flippant about bears; he used to be a professional hunter of them, and long ago he, with his partner, killed two hundred and thirty-six grizzlies in the Rocky Mountains. But at last a grizzly got his partner, and Fox exchanged the Rockies for an abode in the Sierra. He has been there seventeen years now; says he likes it better than he does anything else, and proposes to "stay with it."

For some time, Lucy and I had wished to capture a desirable mountain, and name it after Stanford University; and so, when somebody left a Sierra Club cylinder down at the Stanford Camp, I brought it up and we proposed to plant it. Owing to a slight accident in camp, Lucy was feeling under the weather, and to make the trip less fatiguing, we next morning saddled Grasshopper and the mare, and rode up Bubb's Cañon, and then through South Cañon to East Lake. The trail beyond to Castilleja Lake—if one may call it a trail—is extremely steep, and I did not regret the time I had spent looking over 200 mules for the ones with the strongest hind legs. I went on before, the train followed—three of them, for Peggy had insisted on tagging along for company's sake—and Lucy was rear guard to prevent their turning back. At the timber-line, I went on alone to search out a route among the polished granite mountain-ribs to the lake. This found, the beasts came through all right, and we camped two hours before sunset.

In the morning, we gathered up from the stiff frosty grass the ropes of our chilled animals, and succeeded in leading them up to the top of the face of the immense ter-

minal moraine that blocks the mouth of the gorge just south of the lake. Here, thick with good feed, was a charming little meadow, into the middle of which we dragged large rocks — there being no trees or bushes — and thereunto anchored the stock.

This gorge — the same we had traversed on the Mt. Williamson trip — we now ascended; and having clambered up the cliffs at its head, turned eastward, and began to climb the adjacent steep and craggy peak.* Working slightly to the north, we soon reached the top of the eastern wall, and looked over into an appalling gulf, from one to two thousand feet deep. Facing now southeast, we scrambled on, up among the wild pinnacles, and at noon gained the summit crag. The elevation seemed about 13,600 feet, and the view, especially to the south down the long and peculiarly straight cañon of the Kern, and to the southeast toward the Williamson-Tyndall group, and southwest to the beautiful, snowy Kaweahs, was extremely interesting and wonderfully beautiful. As it seemed that we were the first to make this ascent, we built a monument and left a record, naming it, in honor of Capt. John Ericsson, and in recognition of its extremely craggy character, *Crag Ericsson*. On the last Sierra Club map it is marked "No. 5."

The reason we did not name it Mt. Stanford was because from its top we could see that the next mountain to the east — "No. 6" on the Club map — was considerably higher, and therefore we kept this name for it. Working cautiously down the bottoms of deep and almost vertical crevices in the eastern face of Crag Ericsson, we landed on the edge of the divide and followed it eastward. Presently we came upon three stones built together, marking the

* See Plate XVI. This sketch is from the summit of Mt. Brewer, 13,886 feet high, looking southeast, and eleven miles in an air-line from Mt. Williamson.

Hornet Pass

Craig Canyon

25

M. S. 1000



CRAIG ERIKSSON

From a drawing by Redford Coot Brown.



head of Harrison's Pass.* According to my notion, it will hardly be a popular pass until a windlass and cable are put at its head. Beyond this we ascended a great slope of big, tumbled rocks, and at its top, just where you can first look over into the deep, snowy gulf to the northeast, we found another monument. Its single record showed it to have been made two years before by Warren Gregory and his companions.

It now became apparent that the summit of this peak is the sharp edge of a thin wall, or curtain of rock, of vast height, and precipitous upon both sides. This knife-edge runs north and south; it may be a thousand feet long, sags a hundred feet in the middle, and rises into a point at each end. These ends are very nearly the same height, and the above-mentioned monument was at the southern point. But we thought the northern one was a little higher, as it was certainly the natural termination of the promontory, and decided to put the club cylinder there, if possible. Though she had climbed steadily for nine hours, Lucy had not felt quite herself all day, and so now, when I cautioned her that the passage along the soaring knife-edge, with its 2000-foot precipices on either side, might prove trying to both nerves and muscles, she wisely decided not to attempt it. After arranging to meet at a particular lake in the amphitheatre below, which she was to reach by following down the edge of the southwestern precipice, and descending Harrison's Pass,† and I by descending the peak upon its northern side, and dropping over into the amphitheatre from the north, Lucy started back, and I slowly let myself over a smooth rock, and began to work out on the knife-edge,

* See Plate XXVI, Vol. I, of the BULLETIN. In this photograph, to the right, just off the picture, is Crag Ericsson; to the left, just off the picture, Mt. Stanford. The dotted line goes through the cliffs at Harrison's Pass.

† See Plate XXVII, Vol. I, of the BULLETIN. The peak just to the left of the dead tree is Crag Ericsson; the next peak, to the right, is on the map as "No. 1," and Mt. Stanford is just behind it. You are looking northerly, Tyndall Creek runs diagonally and heads to the right, or east.

along the top of the wall. In twenty minutes I had accomplished it, and, across the depths beneath us, exchanged shouts with Lucy, now but a moving speck among the rocks.

The altitude is probably not far from fourteen thousand feet. A bird like an eagle, soaring grandly far beneath, saw me or heard my shouts, and circled slowly up to my level; and then higher, and higher, till lost in the depths of the dark violet sky above. Fourteen thousand feet was nothing to him.

I built a monument and left in it the Club Register, No. 14, with the name Mt. Stanford upon it. The idea of descending northward I abandoned because of the complicated masses of pinnacles, gulleys, and precipices in that quarter, which would delay me too long; and started to go back the same way I came, intending to follow down Lucy's route. But an apparently practicable chute, just where the knife-edge joins the northern peak, tempted me into trying, instead, the descent of the western face. I managed to get down about a thousand feet, and was then stopped by a sheer precipice. However, after climbing back up the chute some distance, it proved possible to work southward from gulley to gulley, and in this way I gradually descended to the cliff-base, and went flying down a steep snow-slope, and out over half a mile of talus blocks to the rock-encompassed pool where Lucy had for some time been awaiting me. An hour before sunset we reached Castilleja Lake, and next morning rode down six thousand feet to our permanent camp in Paradise Valley,—and a rough old ride it was.

But we had not been there very long when I began to hanker for another try at Mt. King, which I had tried last year, but had not succeeded in climbing. One evening I suggested to Lucy that I rise very early the next day and endeavor to get to the summit of Mt. King, and return

before night. She replied, "I wish you would; and I hope you will get to the top. I would a great deal rather that you should do it than anybody else." After that, what could I do but go?

So in the morning, about an hour after sunrise,—which was at least two hours later than it should have been,—I took a lunch and a forty-foot rope and started out. Lucy came with me to the river bank, and the old mare ferried me over. Realizing that there was not a second to waste, I at once put on full steam and hustled through tangles of bushes, and trees, and jumbles of fallen rocks at a great rate. All the raspberry bushes had been recently pawed over, and the ripe berries had been eaten, so I fully expected to see a bear, but none appeared. However, in a way, I had a bear as guide; for I followed the tracks of one up the gulley of the second tributary from the east, gaining thus the wider cañon above. The first section of this cañon is painfully long, and its floor is exceedingly rough. At its head I ascended a steep slope, two or three hundred feet high, alongside of a series of cascades. From the top of this rise, exactly centering the picture between the cañon walls, there appeared a sharp, hard peak, which I knew must be the edgewise view of Mt. King. It looked very far away, and seemed as though it would take at least the rest of the day to reach its base, let alone climbing it. However, I kept on going, and tore through the exasperating jungle of interlocked manzanita bushes and crooked poplars, "regardless." Finally I got above this, and hurrying up grassy slopes and rocky knolls, at last left the timber altogether, and ran a couple of miles to the head of a long couloir that terminates against a southern spur of Mt. King. At about half after eleven I sat a few minutes and lunched by the very last green spot. Then I went directly up the steep southern face of the peak, until, some five hundred feet below the summit, I could look over its eastern shoulder—a

look which quite gave me a qualm—it being absolutely sheer for more than a thousand feet beneath. Working across to the western edge, I looked over that precipice, and it was deeper still. These two walls approached each other, and where they met is the summit. Near the top the rocks got steeper and became more like vertical cliffs. At last I could climb no higher unaided.*

Poised on a narrow ledge, I noosed the rope and lassoed a horn of rock projecting over the edge of the smooth-faced precipice overhead. But a pull on the rope toppled the rock bodily over, nearly hitting me, who could not dodge. So I took out the noose, and having tied a big knot in the rope-end, threw it repeatedly until this caught in a crack, when I climbed the rope. I did not dally with the job either, for every second I was afraid the knot would pull through the crack. A few yards above, the operation had to be repeated, and before the summit was reached, it was repeated several times. The ugliest place of all was exactly at the last rock, only a few feet below the top. With great caution, and as much deliberation as I had used speed below, I finally looped the rope over an all-too-slight projection, along the upper edge of the side face of the topmost block, and compelled myself to put one foot in it and lift myself, and so stand, dangling in that precarious sling, until I could get my arms on the top and squirm over.

This summit is more like that of the spire of Strassburg Cathedral (550 feet) where I once stood, than any other peak I ever climbed. It is a true spire of rock, an up-tossed corner at the meeting of three great mountain

* Upon this steep southern face of the peak, I kept running across the fresh track of some animal like a large sheep or deer. He seemed to be going up ahead of me, the track was so fresh. And I saw no returning track, though I passed quite across the territory over which the animal must come down. These tracks went well up toward this extreme summit, and into higher or wilder places than I ever saw sheep or deer tracks. But on my descent, I found the tracks going down again. Is it possible that I had scared up a bighorn, which started up the peak for safety, but being followed, stood behind some crag while I passed on up to the top, and then came out and ran down?

walls.* It is about thirteen thousand two hundred feet high, stands somewhat isolated, and commands a glorious view. It is accessible only at the place where I went up, and only with a rope at that. The top of the summit-block slopes northwest, is about fifteen feet across, and as smooth as a cobblestone. If you fall off one side, you will be killed in the vicinity; if you fall off any of the other sides, you will be pulverized in the remote nadir beneath.

About half-past one I roped myself down again, spider-wise, from this airy pedestal; and having left a row of monuments as far as the green spot where I had lunched, scampered away down the long couloir, jumping bowlders, pools, and streams in the highest spirits. I continued to run wherever the surface did not make it absolutely impossible, hurried in the tail of the afternoon across what seemed like miles and miles of chaotic masses of big talus blocks, then, in the deepening shadows, down the throat of the narrow gorge where the stream dashes, in the twilight over massive bowlders in titanic heaps along the base of the Paradise Valley walls; then, in the dark, across the rushing river I went, foolhardily, mid-thigh deep; and then, rustling through the fallen white oak leaves, I sighted the gleam of Lucy's fire, and in a moment more,—was home.

That ended our mountaineering for the summer. We remained some days longer in the cañon; indeed, we stayed until, notwithstanding that we had had three mule loads of provisions, we were actually starved out. The streams had gone down two thirds, and where six weeks before we had washed the dishes, tall plants grew. The grass plumes held ripened seeds, and in the jungle swamps, tiger lily and columbine had given place to golden rod. As we listened

* See sketch of northern face of Mt. King in the *BULLETIN*, Vol. I, No. 8, page 245. The wall to the right runs west, that to the left runs northeast; and upon the other side, and making the third "great mountain wall," is another running south. The report of the old State Geological Survey says that this northern precipice of Mt. King is "several thousand" feet high—but I should not dare to guess so generously as that.

to the music and watched the green swirls of our beloved river, golden leaves—autumn's first—glided by. Then we remembered that life is not all play, and knew the time had come for us to leave this noblest of playgrounds.

And so we went, with sincere regret, and many pledges to return, down through the wild beauty of the long cañon, up the steep trail, and out over the rolling, forest-clad foothills, toward the yellow plains, sixty miles away.

MT. BREWER

MOUNT BREWER

From the N.W. - Drawn by
B.C. Brown from Wood's sheep corral
in the Copper Creek basin.





NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

CAMPING A-WHEEL.

In the summer of 1894 the writer rode a cushion-tired wheel, weighing fifty pounds, and loaded with ten pounds of baggage, from San Francisco to Lake Tahoe, and back to Stockton; and for two years considered it the finest trip he had ever had. Last summer, however, it was surpassed in his estimation by a tour over the same ground, in company with Messrs. Lincoln Hutchinson and James S. Hutchinson, Jr. Our route from Sacramento lay through Folsom to Auburn, and along the line of the Central Pacific Railroad, in places beside the track, and again on the wagon road, to Truckee, and then over the toll road to Lake Tahoe. After spending four days, walking and camping among the magnificent granite mountains west of the Lake, we returned over the Placerville road to Stockton. In this case we had lighter wheels—mine weighed twenty-three pounds,—and it occurred to my friends that, as I had carried a total of sixty pounds on a cushion-tire, we ought to be able to carry forty pounds each of blankets and provisions on our improved mounts; and so we decided to try a camping trip. In spite of two "blow-outs," a broken crank, a broken saddleclamp, and the fact that neither of the Messrs. Hutchinson were in good practice at the start (though they were at the finish), the trip was voted a great success. In the hope that our experience may prove useful to some readers of the Sierra Club BULLETIN to whom the expense of getting to the mountains seems heavy, we venture to make a few suggestions applicable to bicycle camping trips in general. The road maps now published will usually suffice for information as to the country through which it is desired to pass.

Carrying the Outfit.—The general principle to be observed is, Keep the weight off those parts of the wheel that are moved in steering. The following plan is recommended: Buy a leather "touring-bag," made to fit into the frame, which will cost about \$3.50. This is to carry the cooking utensils and the provisions, and it is better not to attempt to carry a much greater quantity of provisions than it will hold. The blankets, clothing, and any small quantity of provisions that will not go in the "trunk," as

we called it, should be made into a roll about sixteen inches long and of as small diameter as possible, and fastened behind the saddle. Various forms of carrier for the pack behind the saddle may be devised, but a couple of pieces of clothesline, four feet long, with a loop in one end, will answer admirably. The pack may be securely fastened to the wheel as follows: Make the blankets into a tight roll, sixteen inches long, pass a strap around each end, and buckle firmly. Balance this on the rear wheel, buckles on top. Standing behind the wheel, hold the looped end of one of the pieces of clothesline, and pass the other end forward, under the roll, *outside* of the rear forks, and then upward, *between* them. Take a turn around the horizontal part of the saddlepost, forward of the saddleclamp, bring the end of the rope over the bundle and pass it through the loop. Do the same with the other rope on the other side of the rear forks. Then, holding the roll up against the saddle with one hand, pull upward on the free end, first of one rope and then of the other, and when as tight as possible, fasten with any suitable knot. This operation should be managed in such a way that the loops and knots are low down on the back of the roll, not under it. Then roll up the spare clothes and anything that cannot be put in the trunk, and use the ends of the straps and of the ropes to fasten this roll on behind the blankets. By passing the ropes around the forks as described, they are kept sufficiently far apart to prevent the bundle from swinging sidewise too much; by taking a turn of each rope around the saddlepost, instead of suspending the weight from the hind part of the saddle itself, the danger of breaking the saddleclamp is avoided; and finally, by having the knots and buckles come in the positions mentioned, before putting on the second roll, the entire pack is kept from sagging on the rear wheel. When a pack is put on behind the saddle, the step cannot be used for mounting, and it is advisable before starting on a trip to learn thoroughly the pedal mount, for the reason just given, and also to enable one to mount on a hill. One should practice until able, in mounting, to start the wheel by the weight on the pedal, without any forward push, as the pack is apt to be too much for one less expert. And it should be practiced on both sides of the wheel, especially if the party expects to do any riding beside a railroad.

What to Take—Blankets.—We each carried a sleeping bag about three feet wide, made of one double blanket and an outer canvas cover, and there were two rubber blankets in the outfit. We intended to put these latter on the ground at night; but it was so cold at night in these mountains, that we found it necessary to use them for a tent. By locating the bed beside a log three or four feet in diameter, rolling a twelve-inch log to the foot, stretch-

ing a small rope from one to the other, and fastening to the rope the rubber blankets, and then piling brush along one side, we constructed a fairly serviceable tent, which kept the temperature above the freezing point. But we concluded that a regular tent made of very light canvas, and arranged with guys so that it could be set up with only such poles as can be cut with a small hatchet each night, would not only be more satisfactory, but would also save a great deal of time night and morning, when time is most valuable. Such a tent should weigh no more than the two rubber blankets, and would answer more purposes. On cold nights it was found necessary to supplement the regular bicycle costume with a suit of heavy underclothes. Possibly a sweater would be found more serviceable.

Utensils.—The pails we had, instead of being circular in section, were rectangular, and for convenience in carrying were made so as to "nest." This form is recommended for another reason: They will stand closer together over the fire. For a party of three, there should be five pails, the largest holding from a gallon to a gallon and a half. Two of them should be arranged so that they can be used as a water bath for cooking mush, etc., which device we think will save much time and annoyance. We carried our pails in a wooden frame, strapped in front of the handle of one bicycle, and we put the soap and towels inside the smallest one. This arrangement rattled so much, that the hitherto silent steed was dubbed by one of our party, the "ice-wagon." Of frying pans we had two, which had been purchased some years before with two second-hand army haversacks. These pans were oval, and each had an oval tin cover, hollow like the pan, and fitting into a groove around the edge of the latter, so as to include between pan and cover a space an inch or more deep. This combination made an excellent arrangement for cooking bread, on the principle of a Dutch oven. The handles were hinged so as to fold over the cover of the frying pan and clamp, thus holding the arrangement together in transit. We would recommend a single frying pan of this form, but twice the size of ours. Each person should carry his own tin cup in such a way as to be readily accessible at all times. A good way is to hang it on the forward buckle of the trunk flap. A small hatchet is indispensable. We carried ours in one of the trunks, with a grooved piece of wood tied over the edge. Probably a "stove," similar to that described in the article on Mountain Trips, in the last BULLETIN,* would be worth taking.

* Vol. I. p. 32. Mr. Longley calls attention to the fact, that through a slip of the pen, the iron was made needlessly thick and heavy. One-eighth inch he thinks is heavy enough.

Provisions.—We took such as are taken on any camping trip. We made no attempt to carry a supply to last the entire two weeks, but found that what we could take was, with the bread and milk purchased daily, sufficient for about one week. We bought a dozen eggs at Cisco, which we carried safely for some miles, and at Truckee we replenished almost our entire stock at very reasonable prices. Several days later we bought some potatoes. Rice, flour, meal, etc., should be carried in small cloth bags, properly labeled with indelible ink. If tied so as to leave a little space inside, these will readily adapt themselves to the shape of the trunk, and pack snugly. It should be said, however, that on account of rain, lack of time, etc., we thought best to get some of our meals at hotels. Perhaps the following data may be of interest:

Meals in camp	101	Meals at hotels and restaurants	31
Total cost	\$10.60	Total cost	\$8.35
Cost per meal per person	10½ cents	Cost per meal per person	27 cents

The best lunch for such a trip is a pint of milk and a large chunk of bread. It satisfies both hunger and thirst, it costs very little in the mountains, and at the same time reduces the quantity of provisions to be carried, and it permits hard work almost immediately afterward. We bought our milk wherever convenient in the morning, and carried it in our canteen, slung over the blanket roll or over the handle. It is advisable when milk is used for lunch not to drink too much of it at other times. And it may also be said, that it is necessary to be sparing in drinking water during the first two or three days, in spite of the terrific thirst, which will pass away in time.

The most essential points have now been covered, but a few minor suggestions may be worth making.

The trunk is apt to bulge out, so as to come in contact with the ends of the cranks and the sprocket, which will soon wear through the leather. To prevent this, pass a piece of buckskin or string through small holes made at the points on which the wear comes, draw the sides of the trunk together and knot the ends of the cord.

All the wheels ought to be provided with brakes, not for use in coasting, which wears out the tire, but to guard against accidents. It gives one confidence, and permits greater speed in riding on roads with sharp turns; it enables the rider, by quickly checking his speed, to avoid many collisions with large stones or other objects in the road, which might severely strain or damage the bicycle, and it is a safeguard in descending a steep hill.

The rear tire has to support nearly all the weight of the rider and pack, and there is no economy in trying to get along with a

badly worn one. Much time and annoyance would probably be saved by using comparatively new tires on both wheels. If double-tube tire is used, and the outer case is badly worn, or much pierced from old punctures, exceedingly fine thorns or bristles are apt to reach the inner tube, and it is almost impossible to locate the resulting punctures, especially as there is often no still water for miles in the mountains.

With a small quantity of iron and copper wire, and a light pair of pincers, a few wire nails, plenty of strong string, a few buckskin thongs, extra straps, a couple of small machine bolts, a piece of tin, ingenuity, and occasionally the assistance of a country blacksmith, it is astonishing what apparently irreparable accidents can be overcome. But in case of a broken crank, don't try to mend it—telegraph for another, and wait till it comes. We speak from experience.

Finally, pay no attention whatever to statements about roads. Sometimes they are reliable, but here are two examples: On the writer's first trip, mentioned above, he was told in Sacramento by two people, who were vouched for as having been over the road which follows the Central Pacific Railroad, that he could n't possibly get to Lake Tahoe on it; that it was full of bowlders, and that a buggy which had come over it a couple of weeks earlier during the great railroad strike had been literally smashed to bits. As a matter of fact the road was very good, except in places where the dust was deep, and there were no bowlders in it. Again, our party last summer were informed by a couple of sheep herders, who had just come over the road between Cisco and Summit, that we had better ride on the railroad, as on the road we should have to carry our wheels—we could not possibly push them. The following day we covered the level portions of the road mentioned at the rate of twelve miles per hour, finding it the most enjoyable portion of the ride. One of our party rode over it with but one pedal. And yet, to the best of our knowledge and belief, these people were not practical jokers, but actually supposed they were giving useful advice.

Our principal reason for undertaking a camping trip on bicycles was to save expense. Upon our return we figured up that, exclusive of some repairs, but including expenses on the boat to Sacramento and railroad fare from Stockton to San Francisco, we had spent \$12.85 each during the two weeks. But we found that this way of traveling is not only economical, but is also ideal for the mountain lover. One is absolutely independent of everything except wood, water, and something which comes in the general category of things called roads; and almost any kind of road will do. My friends, who had just returned from King's River Cañon,

spoke frequently of the great relief of not needing to regard the question of pasture. And when one goes for the pleasure of the trip, and is not limited as to expense, many improvements might be adopted. For instance, we think very likely an eider-down sleeping bag would be lighter and warmer than our blankets, and many conveniences for saving time in camp might be devised. But, even with such a rough-and-ready outfit as our party had, we all unite in saying that for a vacation there is nothing like camping on wheels.

ROY R. DEMPSTER.

SAN FRANCISCO, March 27, 1897.

REPORT OF A TRIP FROM YOSEMITE TO KING'S RIVER, VIA THE
BASIN OF THE MERCED.

On the 3d of July, Mr. Theodore S. Solomons, '98, Mr. Allan L. Chickering, U. C., '98, and myself, left Yosemite by the Little Yosemite Trail, with four pack horses. In taking a cut-off from the head of the Nevada Fall to Lieutenant McClure's trail from the southern base of Starr King, eastward to the Merced River, we encountered some difficulty on the slopes southwest of the Little Yosemite, but for the benefit of those who in future may try this route, we monumented the way to smooth country. We passed to the north of Mt. Starr King, just above the steeper slope of the cañon wall. Here storms delayed us for two days; then we made good time. We struck McClure's trail about three miles east of Starr King, and followed it to the river. It is nowhere a *trail*, being simply a blazed route, portions of which were formerly used by sheepmen. The blazing was done by the cavalry in 1895. Very smooth traveling is found until the slopes of Mt. Clark are reached, when the route leads over rocky ground, intersected by spurs descending from the mountain. The last pitch toward the river is down a steep, brush-grown slope, where the route is very obscure and the way dangerous to inexperienced animals. Three or four hours' work with an axe and crowbar, however, would be sufficient to make a fairly good trail of it. This was the only really bad place we found along the whole route to the Little Jackass Meadows, with the exception of the unblazed portion now to be noticed. From the main river to the point on the McClure Fork where we intersected the trail described by Lieutenant McClure as leading from Jackass Meadows to Tuolumne Meadows, we failed to find any clear trail; but we experienced no very great difficulty in reaching that point by a route of our own, along which, however, there were traces of the passage of the cavalry, notably, down the river, from the ford nearly to the McClure Fork.

The Merced Cañon country, I should note in passing, we found surpassingly fine; and in my judgment, no more important work could be attempted by the Club or the authorities of the Park than the rendering of the Upper Cañon of the Merced accessible to Yosemite tourists. The depression through which runs the main stream and its many branches is irregularly formed, and hence presents scenery of varied and most picturesque qualities. Bare walls, bosses, and promontories strongly suggest the great valley beyond, in the hue of the granite and its peculiarly bedded structure. In the wide cañon bottom is an uninterrupted succession of groves, meadows, and lakes, and on the ridges above, and in the basins of the smaller streams, the forest growth is the most healthy I have seen in analogous portions of the range. I noticed a remarkable scarcity of dead trees, especially of the "Tamaracks" that grow among the wet meadow flats. Towering above the forest ridge, finally, the main crest on the east and the strikingly fine Merced Group on the west nearly enclose the Merced Basin, and from all points furnish splendid backgrounds to the views. Between Lake Merced and Lake Washburn there should be no great difficulty in finding a good route; and above the latter the cañon is wide and not hard to traverse. A few miles above, the Lyell Fork enters the main cañon—now a fine river valley—over one great sweep of bare granite, a couple of miles in length, down the slanting face of which the stream makes a continuous cascade. All the tributaries, Gray Peak, Red Peak, and Black Peak Forks especially, show cascades only of less dimensions and splendid appearance than that of the Lyell Fork. Finer country to camp in does not exist in the Sierra—when once the region is pierced by a good trail from the west. The lakes have been stocked by the Fish Commission, and the whole length of the river for some fifteen miles should soon be populous with trout.

From Mt. McClure Fork the blazed route out of the Merced Basin is a splendid one, and the final climb to the pass and the descent to Granite Creek on the San Joaquin side so short and easy as not to be worth mentioning. The same divide is crossed that was considered impassable by the old California Geological Survey. There is apparently just this little nook of a pass that had been spied and quickly utilized.

With the exception of the obscure section after crossing the main river north of Mt. Clark, previously alluded to, the route marked on the Club map, and drawn in more detail on Lieutenant McClure's map presented to the Club, is perfectly plain throughout. The branching of the trail below Sadlier Lake is indicated by an immense monument and two T's. In approaching Little Jackass Meadows by the easternmost of the two branches, no direct connection is made with the Mammoth trail, but the lat-

ter is so well worn that it cannot be missed. You have simply to continue south. The cut-off eastward to the latter trail from a point a few miles below Sadler Lake we did not identify with any certainty.

Following the Mammoth trail from Little Jackass Meadows to Granite Creek, we then made our way without difficulty down the eastern side of that creek, and intersected, some miles below, the Shut Eye trail, as it is called, leading to the Miller & Lux bridge on the main San Joaquin. The bridge across Granite Creek on the trail, having been washed away last spring, the sheep herders now use a ford considerably higher up, and take a cut-off trail east, northeast, and then south, intersecting their main trail about halfway down the hill to the river. After crossing the San Joaquin, we kept south, parallel to the South Fork, along the Lower trail (which we found difficult to follow, perhaps owing to recent heavy rains), to Mono Creek, which we pretty thoroughly explored to its highest sources. Thence we traveled by trail to Lost Valley and to the north branch of the South Fork, from which an expedition was made to Mt. Goddard, the peak being climbed in a storm which effectually shut off the view. Two of our horses having cast their shoes, it became necessary to make a visit to Ockenden's, where is to be found the nearest blacksmith shop. There being time for no further exploration of the crest, Mr. Solomons left the party, and Mr. Chickering and myself then took the Dinkey trail to Tehipite, the Tu-ne-mah trail to the Upper Middle Fork Cañon, and the Granite Basin trail to King's River Cañon. From there we quitted the mountains, via Millwood, which we reached August 2d. The joint collection of negatives which was secured during the trip consists of about 100 of the size 6.2 x 8.2, and some fifty of 3.2 x 3.2. The topographical and other data gathered will be put into the form of a supplemental report by Mr. Solomons, and added to his report on this region, filed with the Club last April.

The season was unusually stormy. We had rain, hail, or snow some sixteen days out of twenty-five, and, contrary to precedent it rained during the night several times.

WALTER H. STARR.

NOTE TO PROFESSOR STILLMAN'S ARTICLE ON A TRIP FROM
KING'S RIVER CAÑON TO TEHIPITE VALLEY.

While the shortness of the distance between the two cañons makes the route described by Professor Stillman in the last issue of the BULLETIN the most desirable one, it will be noticed from his account of it that, in its present condition—which is not likely soon to be improved—the trail from the divide

to the Middle Fork is obscure, and the way treacherous and quite impracticable for animals. It may be well, therefore, to remind those who may desire to visit Tehipite from the Grand Cañon, or *vice versa*, that there is another, and a very plain and safe trail, by which the trip can be made. It is true, as Professor Stillman suggests, that the time required by this other route is considerably greater, but, as offsetting this, the intending traveler may promise himself some expansive views of the wildest part of the High Sierra, and also some cañon scenery quite different from, yet fully as inspiring as, that of either Tehipite or the Grand Cañon.

The route referred to makes use, first, of the Granite Basin trail to the Upper Middle Fork Cañon; next, of the Tu-ne-mah trail to Collins' Meadow (Crown Valley), and lastly, of the excellent trail thence to the floor of Tehipite. The journey may be traced on the new map; and with no other guide than that the tolerably experienced Club member could doubtless make the trip without mishap; but for the inexperienced, a few verbal directions may not be unhelpful. For the suggestion of the cut-off near Collins' Meadow and the route to the summit of Tehipite Dome, I am indebted to Mr. W. A. Starr and Mr. A. L. Chickering. The trails and the district they traverse will be found described in some detail, and illustrated by photographs, in the report on the region north of the main King's River, filed with the Club by the writer, last April.

If the start is made from the South Fork, follow the trail leading up the cañon on the north side of the river. When within a few hundred yards of Copper Creek, which is the large tributary entering from the north just east of the escarpment of the North Dome, a branch trail will be encountered, leading obliquely to the left. This is the Copper Creek, or Granite Basin, trail. It ascends the main stream of Copper Creek for about two miles, the ascent not being very steep, and then follows the long, sloping shoulder between the main basin of the creek — which now sweeps toward the northwest — and a western branch bearing down from Mt. Hutchings. Arrived at the summit of the wall overlooking Granite Basin, if the trail has been obscure, search along the divide for the monuments, and until the bottom of the basin is reached, be careful not to advance without their guidance. Before leaving the divide, glance over the basin, fixing in mind its topography, and especially the position of the lowest point of the northern rim of the basin. This is the pass. It will lie in the direction north by ten or twenty degrees west. When the trail becomes obscure, or is lost at the bottom of the basin among the meadows, make straight for the pass, keeping, however, toward the right, or east side, of the basin. As the ascent is

made toward the pass, you cannot fail to fall into the trail, nor to keep it thereafter until it reaches the Middle Fork. Just before getting to Dougherty Meadow, though, when skirting the southern margin of a pond, avoid a well monumented and blazed trail which leads to the right, southeastwardly up the hill. Mr. Starr also reports that the terminal point of the trail in the Middle Fork Cañon is about midway between Horseshoe Creek and Dougherty Creek, instead of being nearer the former, as it was drawn on the map, and also that the distance between the two is not so great.

The bridge across the Middle Fork was swept away in 1895, and has probably not been replaced, but at any time after high water the stream may be forded at many points above its site. Trails lead up the river on both sides. Cross to the west, and follow the path on that side along a sandy flat, strewn with bowlders, to the angle formed by the intersection of the main cañon with that of Goddard Creek. Here, winding in zigzag curves, now on one face of the angle, now on the other, the Tu-ne-mah trail makes its steep ascent to the very summit of the mountain, 4900 feet above, in something like five miles of trail. In making the climb with laden animals, be sure not to start after the noon hour, as, on reaching the summit, an equally steep descent of about 2000 feet immediately follows. The trail is much worn by sheep and pack animals, but in some of the steepest and rockiest places, sheep have made many false trails, which are apt to cause annoyance, though they cannot mislead for any distance. It is well, therefore, to constantly reconnoitre ahead. From the summit, the trail is plain to Alpine Meadow, to Blue Cañon, and to Collins' Meadow, where one of the oldest trails in the mountains leads out to the Pine Ridge Settlements. Near the corner of Collins' Corral the Tehipite trail parts from the Tu-ne-mah trail, and runs south by west to Tehipite, keeping well above Crown Creek. It is not necessary, however, to go to Collins'. After passing Kettle Rock (which lies to the north, and not to the south of the trail, as the map shows), select a good route, and make directly south across Crown Creek and up the other side to the Tehipite trail. From the Kettle Ridge divide (just before reaching which from the north, there is a little meadow in which you may camp) the Dome may be reached on horseback. Ride southeastwardly directly along the watershed of this ridge, taking care not to get off on little spurs bearing to the right, until a little depression, or saddle, alone intervenes between your ridge and the Dome Ridge, which has a north and south trend. Cross to the latter ridge, and you may ride almost to within a stone's throw of the true summit, which is most safely reached by the spine or crest of the ridge, rather than by the ledges on either side.

Average traveling time would be:—

From King's River Cañon to Granite Basin, one afternoon; thence to Upper Middle Fork Cañon, one short day; thence to meadows north of Blue Cañon, one day; thence to Tehipite, one day. From Tehipite to the end of the stage line at Ockenden's, or Pine Ridge, two and one half days.

THEODORE L. SOLOMONS.

ROUTE FROM THE GRAND CAÑON TO TEHIPITE, DOWN THE
MIDDLE FORK.

There is yet another way of reaching Tehipite, which may in time be found a good alternative, either for the direct route over the ridge described by Professor Stillman in our last number, or for the longer detour to the north described by Mr. Solomons in his memorandum just above. This third route, like the last, leaves the Grand Cañon by the Copper Creek trail, and is identical with it until the Middle Fork is reached, between Dougherty and Horseshoe Creeks. From this point, instead of crossing the river and climbing the mountain ridge on the north, and descending again to reach the valley, the new route follows the Middle Fork directly down. During the summer of 1896, Mr. W. L. Richardson and Mr. T. P. Lukens, of Pasadena, made a short reconnoissance of the eastern end of this route, and afterwards arranged to have some work done upon the trail, of which Mr. Richardson sends us the following account:—

"From the Middle Fork crossing a trail is marked on the map down to Tehipite, and along it is a line of interrogation points, the meaning of which we afterwards learned. Mr. Lukens and myself made the attempt to get down with three heavy packs and two riding animals. The result of about five hours of hard labor found us only two and one half miles from camp. As the prospects for better traveling became less and less the farther we advanced, and as our time was limited, we decided to return. Mr. Lukens employed two prospectors whom we met in the cañon to build a trail down to Tehipite. I named it the Lukens trail, and made two small signs to be placed at each end. Work was commenced the morning we left. I understand the men placed the first sign all right; but reaching a somewhat open meadow they placed the other sign there, thinking they had reached Tehipite. They afterwards discovered their mistake, but did not have time to go back for the sign. Neither did they do as much work on the lower portion of the trail as they would have done, had they had the time.

"The trail is clean and well made for some distance below

Broken Dutch Oven. The rest of it, down to Tehipite, has been cleared of brush, blazed, and monumented. This portion of it is quite rough, and more work should be done on it to put it in good order. I would suggest that if persons going there this summer would lend a hand, and spend each but a few hours in work upon the trail, we soon might have a broad and easy way of reaching Tehipite. And in general, if each member of the Sierra Club who spends a portion of his time in the Sierra, summer by summer, would do a little work on some of the bad places on one of the trails he travels over, in the course of a few years much would be accomplished toward putting our principal mountain trails in good order.

"Some systematic blazing and monumenting in places where trails are not well defined would save a great deal of delay. If a small tin sign could be tacked up at the intersections of the main trails, it would be of great aid to those traveling without a guide. Such signs would cost but a trifle and last a long time! Perhaps this is one of the most important improvements which might be made in the Sierra. To many it is a difficult thing to find their way about the mountains, even with a map and compass, whereas, if at each intersecting trail or branch a sign were placed, it would dispel that feeling of uncertainty, and one would be confident of reaching the end of his journey without having to retrace his steps on some wrong trail.

"Let us begin work at once. There are many campers and prospectors who will aid us when they see we are in earnest. I should be pleased to hear from others on this subject."

W. L. RICHARDSON.

NOTES ON A TRIP TO KING'S RIVER CAÑON.

Our outfit consisted of the usual camp provisions and paraphernalia, the total weight of which, for our party of five persons for a three weeks' trip, was about six hundred pounds.

Our guides were Walter Pettit, an old mountaineer and trapper, and John Botkin, a younger man, who acted as assistant to Pettit. Both men are thoroughly acquainted with the country immediately surrounding the cañon of the South Fork. They are painstaking and careful, and our party all agreed that no guides could be found that would give greater satisfaction for such a trip as ours.

Our animals, of which we had eight (five pack- and three saddle-animals), were furnished by Pettit. They were all in good condition, and thoroughly accustomed to mountain trails. For these eight animals and the services of Pettit and Botkin as guides, packers, and cooks, we were asked only the very moderate sum of \$4.25

per day. We, of course, furnished provisions for both Pettit and Botkin, but they provided the horse-feed, when it was necessary to purchase any.

The actual traveling time, from point to point, was as follows:—

Millwood to Converse Basin	2¼ hours
Converse Basin to Bearskin Meadow	2½ "
Bearskin Meadow to Burton Meadow	2¼ "
Burton Meadow to Horse Corral Meadows	3½ "
Horse Corral Meadows to Summit Meadow	2½ "
Summit Meadow to Fox's Cabin	2 "
Fox's Cabin to Zumwalt's	2½ "
Zumwalt's to Mouth of Bubb's Creek	1½ "

Returning:—

Bubb's Creek to Fox's Cabin	3½ hours
Fox's Cabin to Summit Meadow	2¼ "
Summit Meadow to Horse Corral Meadows	1 "
Horse Corral Meadows to Burton Meadow	2 "
Burton Meadow to Bearskin Meadow	2 "
Bearskin Meadow to Big Trees in General Grant Park	2¼ "
Big Trees to Millwood	¼ "

I give these distances in hours, instead of miles, for two reasons. In the first place, the character of the trails and the country passed over varies so greatly that a distance given in miles conveys a very inadequate idea of the amount of work to be done in going from point to point. In the second place, we could find no two persons who were agreed as to the actual distances.

Two members of our party, with one pack-animal, made a trip to Kearsarge Pass, via Lake Charlotte, and returned via Bubb's Cañon. The traveling times were:—

Bubb's Creek Junction to Lake Charlotte	6¼ hours
Lake Charlotte to Summit of Kearsarge Pass	2¼ "
Kearsarge Pass to Bubb's Creek Junction	5¼ "

LINCOLN HUTCHINSON.

FOOD SUPPLY FOR MOUNTAIN TRIPS.

The interest shown in the timely article by Mr. Howard Longley in the January BULLETIN, on "Mountain Trips; What to Take, and How to Take It," leads to the hope that further contributions of a similarly practical nature will follow. It is of the utmost importance that the Club should encourage its members to take to the field by supplying them with all the information possible; for it is often for lack of just such advice as that given by Mr. Longley that many a half-formed plan of campaign in the Sierra fails of realization.

The food question, especially, is a matter of the first importance. Mr. Longley's list seemed to me to be deficient in meats, and somewhat luxurious as to certain articles that are either bulky

and difficult to handle or that contain a great deal of water. I am assured by the author, however, and am given his permission to emphasize the fact here, that the food supply he suggested was intended for a party that expected to rely on hunting and fishing for part of their animal food, and, in general, that his advice was addressed more particularly to those who proposed short trips to frequented points. Mr. Longley agrees with me, that for those contemplating lengthy or rough trips, or when, for other reasons, weight and bulk must be economized, some modification of his list becomes necessary.

The results of my own experience, and also of that of others with whom I have discussed the subject, were embodied in some suggestions as to outfit which I added to a typewritten report on the region south of Yosemite, filed with the Club last year. The chief points are these: The most important matter for any kind of trip is to take sufficient protein foods, to insure replacement of muscular tissue. The harder the physical work the more protein is needed. An average amount would probably be a little more than is commonly consumed when at home. This is the secret of avoiding emaciation in active or prolonged mountaineering. The other point which applies to mountaineering parties in general is, to secure foods of such palatability as to insure the highest percentage of digestion. To this end the individual tastes of the different members must be consulted, and a kind of average determined. Bulk must never be sacrificed to concentration, or the percentage of assimilation will be lowered.

The details of the ration are best considered by dividing mountaineering parties into two general classes: that to which Mr. Longley particularly addressed himself, or those parties that attempt only a sojourn of moderate length in frequented districts, and intend to travel easy trails; and secondly, that class of parties that set out to traverse the rougher and less frequented districts.

The former class should take as great a variety as possible. They should not hesitate at tomatoes, corn, canned fruits, and potatoes, in spite of the large proportion of water which these contain, if they have animal power enough to transport them, nor at soda crackers and eggs, as long as they are willing to take the time to pack these carefully and can afford the space they occupy. To such—whom I shall envy—I would suggest, also, canned tongue, chicken, lobster, roast beef, and shrimps in tomatoes, as being nearly as palatable as the fresh articles. Chocolate and nuts (unshelled) are fine foods.

For parties of the second class, the several conditions to be secured are usually about as follows: Food that may be prepared easily, and much of it quickly, and in high altitudes; that contains

a proper proportion of protein, that is not too difficult to digest, and finally, that may be obtained in as compact and dry a form as possible.

These conditions are admirably met by the appended schedule, which is arranged according to the leading nutritive, and also the hygienic, characteristics of the several foods. The first three heads form the nutritive classification, and the fourth, the hygienic. To illustrate: Dried fruits, being more useful in the purely hygienic function of furnishing bulk, acting as an irritant, etc., than in the nutritive function of supplying carbo-hydrate matter, have been put in the fourth column, but the figure 2 placed after them indicates also their chief nutritive characteristic. Conversely, butter is most useful as a fat food, but the figure 4 placed after it shows that it has also a hygienic value, in that it assists the digestion of other foods by rendering them more palatable. Finally, certain foods, like beans and bacon, have been related by figures to other columns, to show that they partake also, but in a less important degree, of other nutritive elements.

As to the quantity of each food, the relative amounts here given were found satisfactory by two persons during one season, and by three during another, but only the general proportions of the several nutritive classes are insisted on as important. For instance, while it would be perfectly safe to eat less mush and more bread, or more butter and less bread, it would be poor policy to take too little of the proteids or too much of the stimulative foods. The total amount given is intended to provision three men for a period of four weeks. Those items in parentheses were not always taken by our parties, but are given for the purpose of enlarging the list of convenient foods and of furnishing substitutes, if desired, for some of the others.

I have had some success in carrying butter and keeping it fresh. I buy the best fresh creamery, in square form, wrap an extra butter cloth about it, lay it and fold it in a second cloth liberally sprinkled with rock salt, and finally wrap it well in several thicknesses of sack cloth and tie it lightly. The package is never allowed to become dry, and at night it usually decorates the limb of a tree. Thus treated, the butter should be eatable for at least six weeks.

The surplus lard melted in the cooking of bacon is used for frying; hence, but little of the fats have been suggested.

One thing more—though this is hardly a matter of food. If you would be happy in your bread-making, discard your heavy Dutch oven and beg, borrow, or steal a reflecting oven. They are light, fold up, and fit into the pack bag; your bread, biscuit, pie, pudding, or cake bakes while you are cooking the rest of the meal, and by the same fire, and the contents of the baking

pan are alway in sight, so that none but a blind cook could burn them.

1	2	3	4
PROTEIDS.	CARBOHYDRATES.	FATS.	STIMULATIVES AND DIGESTIVE AIDS.
<i>lbs.</i>	<i>lbs.</i>	<i>lbs.</i>	<i>lbs.</i>
12 Corned beef 3	3 Rice	1 Lard,	1 Salt
12 Roast beef 3	20 Mush cereals . .	2 {Cottolene, or	1/16 Pepper.
20 Ham 3	45 Flour	{Beef fat	1/16 (Ketchup)
4 Tongue 3	4 (Cornstarch) . . .	6 Bacon 1.	1/2 Mustard.
.. (Chicken)	6 Jam or jelly . . .	8 Butter 1/2 . . . .	.. (Vinegar)
.. (Lobster)	4 Chocolate, 3, 4	28 Condensed	.. (Horseradish) . .
6 Cheese 3.	40 Sugar 1/2, 1/4	.. Milk 1, 2, 1/4	1+ Baking powder
4 Sardines 3. . . .	.. (Maple sugar) . .	5 Shelled	.. (Citric acid) . . .
6 Salmon 3	.. (Syrup) . . . . .	.. almonds 1	.. (Lemon ex-
.. (Peptonoids) . .	1 Honey. . . . .	.. (Walnuts) . . .	.. tract)
.. (Dried beef) . .	.. . . . .	.. . . . .	2 Extract of beef.
.. (Smoked her-	.. . . . .	.. . . . .	3 Coffee
.. ring) . . . . .	.. . . . .	.. . . . .	1/3 Tea.
6 Beans 2 . . . . .	.. . . . .	.. . . . .	1/3 (Cocoa)
.. . . . .	.. . . . .	.. . . . .	2 Whiskey
.. . . . .	.. . . . .	.. . . . .	.. (Onions)
.. . . . .	.. . . . .	.. . . . .	6 Dried fruits 2 . .
.. . . . .	.. . . . .	.. . . . .	.. (Raisins)
.. . . . .	.. . . . .	.. . . . .	.. (Dates, figs) . . .

Total, 252 pounds, or 3 pounds per day per man.

THEODORE S. SOLOMONS.

A MAP OF BUBB'S CREEK BASIN.

The small map of Bubb's Creek Basin, which appears in this number of the BULLETIN, will, I hope, be of assistance to those who desire to visit that rugged, though picturesque, portion of the King's River Sierra. The more important trails and routes are shown along the main stream, up the south fork, and about Mt. Gardner and the Kearsarge Pass. The source of the main stream appears to be in a wide basin between the Main Crest on the east and the spurs of the Kings-Kern divide on the south and west. Though no reliable information concerning the trails in this basin was obtained, there can be little doubt, from the appearance of the country, that it is readily accessible to pack-animals.

The positions of peaks were determined by reference to Mt. Whitney and Mt. Williamson, whose geographical coördinates are given in Captain Wheeler's "Geographical Surveys West of the One Hundredth Meridian." These give a base line about five miles long, and are easily distinguishable from any other high points. From this base Goat Mountain, Mt. Gardner, Mt. Brewer, Charlotte Peak, University Peak, and an unnamed peak north of the Kearsarge Pass, were located as accurately as a small surveyor's compass and the local variation of the needle would allow. These six points form the basis of the map. Each was ascended, and the intervening country sketched, the sketch being afterwards

corrected by numerous compass bearings. All the peaks shown on the map were thus located.

The local magnetic variation on some of these high peaks is very great, being as much as 15° in certain cases. Azimuths taken by compass are almost useless, unless checked by back readings from points whose magnetic variations are known. Hence, in general, a small plane table would probably be as good, or even better, for such work.

J. N. LE CONTE.

MAPS OF THE UNITED STATES GEOLOGICAL SURVEY.

Readers of the *SIERRA CLUB BULLETIN* will be glad to learn that the fine topographical maps of the United States Geological Survey, hitherto procurable only through favor or by personal solicitation, are now offered to the public generally at a merely nominal price — in fact, at no more than the cost of the impression. The following communication, recently received from Mr. H. C. Rizer, Chief Clerk of the Survey, gives all necessary information as to how the maps may be procured:—

“By Congressional enactment, approved February 18, 1897, the topographic and geological maps and atlases of the United States made and published by the Geological Survey must be disposed of through sale.

“The topographic maps are prepared from actual surveys, to serve as a basis for the geologic maps, and show surface elevations, roads, and all necessary physical and cultural details. Each sheet is designated by the name of a principal town, or some prominent natural feature within the district, is sixteen and a half by twenty inches, and covers one sixteenth, one quarter, or the whole of a geographical degree, according as the scale is one, two, or four miles to the inch, the scale varying with the character of the country. About nine hundred such sheets have been printed. THEY WILL BE SOLD AT THE RATE OF FIVE CENTS PER SHEET. Orders for ONE HUNDRED SHEETS, or over, whether for the same or different sheets, will be sold at the rate of two cents per sheet. Proportional charges will be made for the larger size and special maps.

“The folios of the Geologic Atlas of the United States, containing the topographic and the areal, economic, and structural geologic maps, together with suitable textual descriptions of the region, will be sold at prices varying with the size of the publication — usually twenty-five cents.

“Lists of maps and folios and other publications of the Survey will be furnished on application. Remittances must be by money order, made payable to the Director of the United States Geolog-

but the DARDANELLES sheet, we learn, may soon be expected, and the YOSEMITE sheet awaits only the engraving. It should be observed that all the sheets of the series are of the same size; the eight larger areas, therefore, at the top of the diagram, are presented on a smaller scale. As far as learned, the completed maps of areas in California, not shown in the diagram, are as follows:—

MAPS OF ORDINARY SCALE.		SPECIAL MAPS OF LARGER SCALE.
Anaheim,	Redlands,	Banner Hill,
Camp Mojave,	Redondo,	Genesee,
El Cajon,	San Bernardino,	Grass Valley,
Escondido,	San Francisco,	Indian Valley,
Las Bolsas,	San Pedro,	Nevada City,
Oceanside,	Santa Monica,	Taylorsville,
Pasadena,		

and one large map, combining the topography of four ordinary sheets, entitled Lake Tahoe and Vicinity.

The following folios of the Geologic Atlas for California are announced as ready for distribution, at the uniform price of twenty-five cents each, save the Nevada City folio, which costs fifty cents:—

Placerville,	Marysville,	Nevada City,
Sacramento,	Lassen Peak,	Pyramid Peak,
Jackson,	Smartsville.	

OUR SISTER SOCIETIES.

The SOCIETA ALPINA MERIDIONALE sends us its CALENDARIO for 1897, containing the programmes of the Club and a valuable compilation of data concerning the heights and various ascents of many Alpine summits.

The ALPINE JOURNAL (London) contains an interesting series of accounts of mountain climbing in the Alps, Norway, and New Zealand, and a brief notice of an ascent of Aconcagua (over 24,000 feet) by Zurbriggen, on January 14th. His companion, Mr. Fitzgerald, failed to reach the summit on account of sickness overcoming him at an elevation of 23,000 feet.

Several interesting articles occur in the publications of the geographical societies.

The February number of the NATIONAL GEOGRAPHIC MAGAZINE contains a careful paper, well illustrated, on Crater Lake and the region about, by J. S. Diller, of the United States Geological Survey. The BULLETIN of the American Geographical Society, XXVIII, No. 4, contains a summary of the topographic work of the United States Geological Survey in 1895, by Henry Gannett, a valuable article on Mexico, its geography, geology, fauna, commerce, etc., by Minister Romero, and a brief account of the utmost waters of the Missouri, by J. V. Brower.

The BULLETIN of the Geographical Club of Philadelphia, and the BULLETIN and COMPTES RENDUS of the Société de Géographie contain interesting articles, not, however, this time, in the line of mountain explorations.

We acknowledge, also, the receipt of the BIENNIAL REPORT OF THE BUREAU OF HIGHWAYS, which has to do with a subject not foreign to the interests of the Sierra Club, and of that valuable journal, SCIENCE, containing many notes of interest which it exceeds our space to notice here.

Among other journals received are the transactions of the Massachusetts Horticultural Society for 1896, and the proceedings of the Academy of Natural Sciences of Philadelphia, 1896. (Pt. 111.)

BOOK NOTICES.

"A Guide to Chamonix and the Range of Mont Blanc," just issued by John Murray, and from the pen of the veteran mountaineer and author, *Edward Whymper*, is a work far above the ordinary guidebook in merit and interest. It is at the same time a guidebook in the usual sense, and a very interesting history of mountaineering in the region indicated in the title. To every lover of the mountains it will be found more entertaining than a novel, and the pleasure of reading is much enhanced by the excellent and well selected maps and illustrations. Of special interest are the accounts of De Saussure's ascent of Mont Blanc in 1787, and of the surveys and work of construction of Dr. Janssen's observatory on the glacier crowned summit of Mont Blanc.

"Mountain Observatories in America and Europe," by Edward S. Holden, published by the Smithsonian Institution, is another new book, the scope of which is by no means confined to technical data, but includes a very interesting compilation of many facts and experiences relating to life and exploits at high elevations. It contains also a considerable number of excellent full page illustrations of mountain summit scenery, collated from various sources.

"Further Contributions to the Geology of the Sierra Nevada," by Henry W. Turner, a publication of the United States Geological Survey, will not be without interest to the Sierra traveler, even if not a trained geologist. Though dealing mainly with the petrography of various districts of the Sierra, it contains many observations of a more general character, relating to the history and structure of the Sierra, that will be of interest to the observing mountain climber. For instance, in the account of the "Yosemite Area" (p. 710), the author notes the observation of

"glacial markings close to the water's edge in August, when the water is low, showing how little cutting has been done since the glacial period. The Grand Cañon has here a depth of 5000 feet." Sierra Club members will also be pleased to note that, "a geologic map will be made of the Yosemite area in the near future." Mr. Turner, in referring to the Mt. Dana area, remarks: "The enterprising members of the Sierra Club of San Francisco are familiar with the district, and in several of the BULLETINS of the Club may be found descriptions and good illustrations of the scenery."

"Rocks, Rock Weathering, and Soils," by G. P. Merrill (The Macmillan Co., 66 Fifth avenue, N. Y., price \$4.00), is a much more interesting work for general reading than might, perhaps, be inferred from the title. The author is Curator of Geology in the United States National Museum, and deals in a very readable way with the influences at work in the disintegration of rocks. The frequenter of the mountains, who has noted the peculiar and characteristic methods of weathering of the various rock formations, will find it very instructive to see here the causes of these peculiarities in the physical and chemical structure of the rocks. Many illustrations add to the clearness of the explanations, and copious quotations and references increase its value to the more special student. The concluding sections on the influence of forests and on the evil effects of their denudation, should be read by all who desire information on the vital questions of forest preservation and management.

JOHN M. STILLMAN.

SECRETARY'S REPORT.

FROM APRIL 30, 1896, TO APRIL 30, 1897.

The past year of the Sierra Club has been one of quiet growth; its outward signs of activity have not been so many as in former years, but the appreciation of its work has been manifested in various ways. Particularly is this true in reference to the recognition that has been awarded the Club's publications by the older kindred organizations of Europe.

The visit of the Forestry Commission appointed by the National Academy of Sciences to the Pacific Coast last autumn was one of great importance to the Club; and the Directors offered every assistance possible to the Commission in its work, and believe that their efforts were to some purpose.

The Register Boxes prepared for the summer of 1896 were much better adapted than the former ones; but they were not ready soon enough, so that but three were taken out. The following reports of them have been made:—

“Register Box No. 13.—Deposited on the summit of PYRAMID PEAK on the 20th day of July, 1896, by Edward R. Taylor and Henry H. Taylor. The altitude of this summit is 10,020 feet. Panorama is: Dick's Peak, north; portion of Lake Tahoe visible in northeast; Tallac Mountain, northeast to left of Tahoe; Echo Lake, northeast by east; Heather Lake, northeast; Strawberry Valley, south; Desolation Valley, north, running to the east. We came from Gilmore's by way of Susie Lake; leaving at 8:30 A.M., and reaching summit at 2:50 P.M. The day is

delightful, with gentle breeze on summit; cloudless overhead, with some cumulus clouds low down in horizon to eastward; temperature, 90° Fahrenheit."—*Edward R. Taylor.*

Register Box No. 14.—“If you go up Bubb's Cañon to South Cañon, turn and ascend it to its fork, a mile or two above East Lake, follow then the eastern fork to its head in an amphitheatre two or three miles east, you will find yourself at the base of the eastern precipices of a grand mountain that juts northward from the mass of the Kings-Kern Divide. It has a sort of double summit. Upon the northern of the two summits I built a monument and left therein the Sierra Club Cylinder, No. 14. The mountain we called MT. STANFORD, and was on the Club map (I think) as peak 'No. 5.'”—*Bolton C. Brown.*

Register Box No. 16 was deposited on the summit of DICK'S PEAK on Sunday, the 26th day of July, 1896, by Samuel H. Boardman and Elliott McAllister. They reported that they climbed to the summit from Half Moon Lake in one hour and ten minutes; that the panorama showed the headwaters of Rubicon River to west and northwest, the Emerald Bay region to north; Tallac Mountain to east, Pyramid Peak to south; that the altitude is 10,015 feet, being 230 feet higher than Tallac Mountain; that a fine specimen of the *Pinus albicaulis* was found a few feet below the summit; that they had climbed north from Half Moon Lake, up the water-run, and well over the saddle on the ridge, before turning west and directly up to the summit.

Register Box No. 10, deposited on the summit of Mt. Tallac on the 26th day of September, 1894, by Mr. Dorville Libby, was found to be in a bad condition. The Register Box was sound; but the record had been completely filled on both sides of the sheets; the sheets were so broken and so badly torn by reason of the character of the

paper used, that the record was brought back to the Club. A strong linen paper has been adopted for the new cylinder.

During the past few months the best of the Club's photographs have been on exhibition in San Francisco, at Mr. Vickery's, at the University of California, and in Los Angeles. The thanks of the Sierra Club are again due to Mr. Howard Longley of Los Angeles, who has presented another album of photographs taken in the King's River Cañon region.

The total collected for dues, for the year ending April

30, 1897	\$826 85
Publications sold up to same date	26 64
	<u>\$853 49</u>

Cash deposited to account of Treasurer	\$846 85
Balance on hand	6 64
	<u>\$853 49</u>

The following are the Directors elected for the ensuing year, at the annual election of April 24, 1897:—

PROF. C. B. BRADLEY, MR. JOHN MUIR,
 PROF. GEORGE DAVIDSON, MR. ELLIOTT McALLISTER,
 PRES. DAVID STARR JORDAN, MR. WARREN OLNEY,
 PROF. JOSEPH LE CONTE, PROF. J. H. SENDER,
 PROF. J. M. STILLMAN.

The officers elected by the Board of Directors will be announced later.

ELLIOTT McALLISTER,
Secretary.

REPORT OF TREASURER OF SIERRA CLUB.

FROM MAY 1, 1896, TO APRIL 30, 1897.

RECEIPTS.

Cash on hand, May 2, 1896	\$242 18
Total cash received from Secretary	824 98
Total	<u>\$1,067 16</u>

EXPENDITURES.

Printing	\$249 10
Clerk hire	60 00
Rent	110 00
Janitor	12 00
Postage and expressage	76 15
Stationery	20 55
Binding	21 60
Typewriting	4 70
Photographic plates and engraving	106 62
Albums	17 15
Maps	201 95
Brass Tubes and expressage	23 10
Commission on collections	19 90
Incidentals	7 51
	<u>\$930 33</u>
Cash on hand	136 83
Total	<u>\$1,067 16</u>

HENRY SENDER,
Treasurer.

REGULAR MEMBERS.

 ENROLLED SINCE JANUARY, 1894.

 This is a continuation of the list published on page 107, Volume I, of the BULLETIN.

ABBOT, MR. PHILIP S.*	. . Milwaukee, Wis.
ANDREWS, MR. T. P.	. . 109 Montgomery St., San Francisco
ATKINSON, MR. CHAS. B.	. . Yosemite, Cal.
BARTLING, MISS FLORENCE	. 2324 Channing Way, Berkeley, Cal.
BAXTER, MR. CLIFFORD	. 2415 Haste St., Berkeley, Cal.
BELL, MR. CHAS. D.	. . Berkeley, Cal.
BENDER, MR. C. T.	. . Reno, Nevada
BENSON, LIEUT. H. C.	. . Presidio, San Francisco
BERRY, MR. THOMAS C.	. 202 California St., San Francisco
BOARDMAN, MR. SAMUEL H.	. 1750 Franklin St., San Francisco
BORLAND, MR. ARCHIE	. Mills Building, San Francisco
BOSQUI, MR. EDWARD	. . 523 Clay St., San Francisco
BREWER, PROF. WILLIAM H.	418 Orange St., New Haven, Conn.
BRODER, MR. JOHN	. . Visalia, Cal.
BROWN, PROF. BOLTON C.	. Stanford University, Cal.
BROWN, PROF. ELMER E.	. Berkeley, Cal.
CALDWELL, MR. WM. A.	. Berkeley, Cal.
CAMPBELL, MR. DOUGLAS H.	. Stanford University, Cal.
CARLON, MR. T. H.	. . Coulterville, Cal.
CARROLL, MR. J. P.	. . Randsburg, Kern Co., Cal.
CARTER, MR. HENRY C.	. 233 Fifth Ave., New York
CHICKERING, MR. ALLEN L.	. Berkeley, Cal.
CHURCH, JR., PROF. J. E.	. Reno Nev.
COLEMAN, MR. A. B.	. . Martinez, Cal.
COOKE, MR. FRED. A.	. Truckee, Cal.
CORBETT, MR. H. W.	. . 18 Rue Bonaparte, Paris, France
CORY, PROF. CLARENCE L.	. Berkeley, Cal.

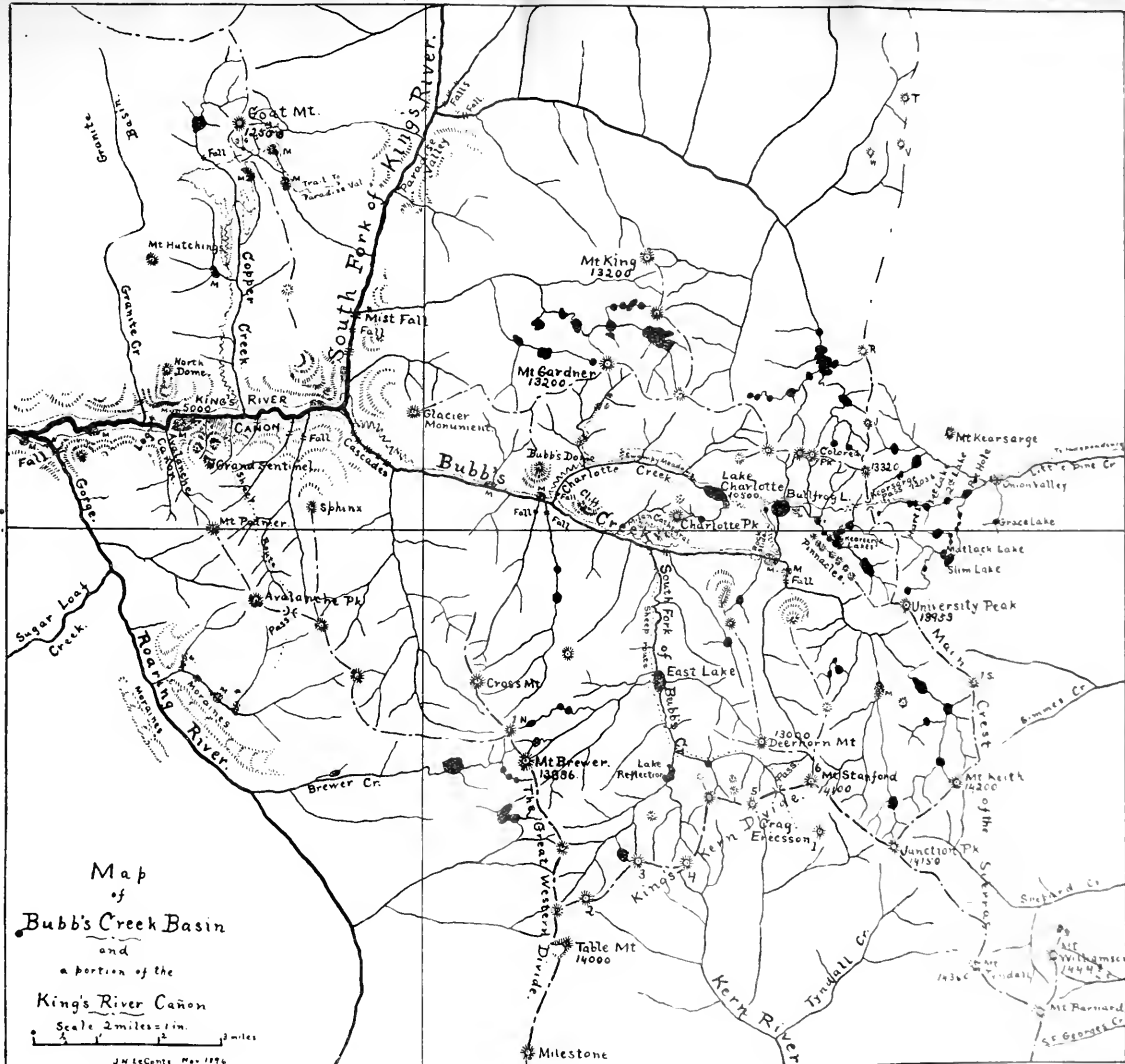
 *Deceased.

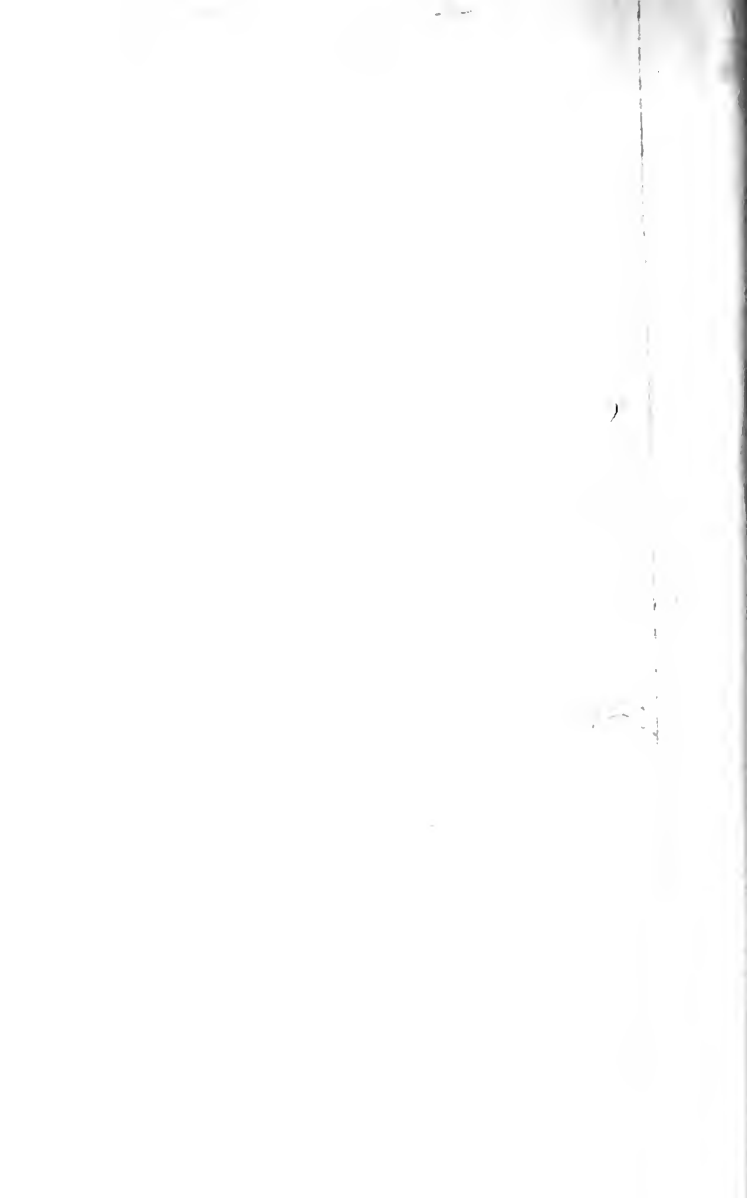
CROCKER, MR. H. R. . . .	Sequoia, Tuolumne Co., Cal.
DEMAREST, MR. D. C. . . .	Altaville, Stanislaus Co., Cal.
DIBBLEE, MR. A. J. . . .	Ross, Marin Co., Cal.
DOBLE, MR. ROBT. MC F. . . .	202 Sansome St., San Francisco
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THE EXPEDITION OF HIS HIGHNESS, PRINCE LUIGI AMEDEO OF SAVOY, DUKE OF ABRUZZI, TO MT. ST. ELIAS IN SOUTHERN ALASKA.

[It is with much pleasure that the BULLETIN presents to its readers the only full account yet published in America of the expedition of the Prince of Savoy to Mt. St. Elias. It has been prepared from a lecture by Dr. Filippo de Fillippi, delivered in Turin before the Italian Alpine Club, and first printed in the *Rivista Mensile del Club Alpino Italiano*, for November, 1897. The translation is by Dr. Paolo de Vecchi, a member both of the Torino Italian Alpine Club and the Sierra Club.—*Editor*.]

In the beginning of February, 1897, Prince Louis of Savoy decided to make an expedition to Alaska and attempt the ascent of Mt. St. Elias. He selected as companions, Umberto Cagni, member of the section of the Torino Italian Alpine Club, Francesco Gonella, President of the same section, Vittorio Sella, member of the section of Biella of the Italian Alpine Club, and Dr. Filippo de Fillippi of the section of Torino. To complete the party there were four guides: Joseph Petigax and Lorenzo Croux, Antonio Maquignaz and Andrea Pellissier; and, also, Erminio Botta, the special guide of Mr. Sella, whom he had accompanied on his trip to the Caucasus.

As soon as the company was completed, the work of preparing the material for the expedition was begun. Dr. Paolo de Vecchi, a member of the section of Torino of the

Italian Alpine Club, who lives in San Francisco, California, and who is also a member of the Sierra Club, took charge of the preparation of food and arms.* Professor Fay, of Boston, ex-President of the Appalachian Mountain Club, took charge of the means for transportation. Professor George Davidson, of San Francisco, and Israel C. Russell, of Michigan, gave much valuable advice and bibliographical information, so that gradually the materials for a successful expedition were prepared, and the trip rendered more rapid and easy. The equipment of the expedition was made in great part in Italy and London, only the food and arms being bought in San Francisco.

The party left Torino, May 17, 1897, and, after spending three days in London buying materials, left Liverpool on the 22d of May, on the "Lucania" of the "Cunard Line," had a splendid trip, and arrived in New York the night of May 28th; and the following morning proceeded, via the Pennsylvania Railroad, to San Francisco, arriving there the 3d of June, at night. The six days in San Francisco were busily spent selecting the food and properly preparing it for such a trip; and on the evening of the 9th the expedition left San Francisco by rail, for Seattle, where it arrived the 11th, in time to catch the "City of Topeka," which sailed the 13th for Sitka, the capital of Alaska. A few days before, the schooner "Aggie," specially chartered, had left Seattle to wait for the expedition at Sitka, bringing with her ten American packers of Seattle, under the orders of Major E. S. Ingraham, who had selected them specially for the purpose.

Alaska, which is so well known at this moment from the discovery of rich deposits of gold, has no need of very much description. It is separated from the English territory by the 141st meridian of longitude W. (Greenwich), to a point

* NOTE.—In this connection Dr. de Vecchi gratefully acknowledges the kindness of Captain Gustave Niebaum, Mr. Leon Sloss, and others of the Alaska Commercial Company.

thirty miles from the Pacific. From this point the boundary line follows the summit of the mountains lying parallel with the coast, in an irregular line, as far as latitude 56 north, at the head of the Portland Canal, and thence down the canal to Prince of Wales Island. It is a long strip of land extending along British Columbia for 500 miles. In its southern part this portion of the coast is an intricate archipelago, a continuation of which extends along the coast of Columbia to the island of Vancouver.

Sitka, the capital of Alaska, lies in this extreme southern point of the territory, among a few settlements of white people, with a great number of Indians. The condition of the country is almost the same as it was thirty years ago, when it passed from the Russian government to the United States. This government has continued, by more progressive methods, to utilize the productions of the country, which are principally furs, fish, and minerals. The Indians of the coast are at present under a very liberal government, but apparently are only in part civilized. They could very much improve their condition if it were not for the unfortunate tendency of the race which renders their civilization difficult.

The trip from Seattle to Sitka occupies six days, and the boat runs through the strait between the island of Vancouver and the coast of British Columbia, along a tortuous canal of the Alexander Archipelago, which is very picturesque and rich in almost virgin forests and in glaciers which come to the sea.

It is impossible to give in this short article an adequate description of these fantastic surroundings, of the strange luminous night in which the sun-setting is confused with the sun-rising, of the sea full of icebergs, which float quietly around the boat, and of the coast capriciously cut up by canals and small bays, and covered everywhere with a thick vegetation of conifers. The trip is a continual suc-

cession of beautiful tableaux of admirable color, and keeps the passenger on the bridge of the boat fascinated by such new and striking views of savage nature.

The most populous city of Alaska is Juneau, the only city formed there since its occupation by the United States. It is situated at the end of a small bay, near a well-known mine—the Treadwell—and is at present the starting point for the miner who goes to the rich placers of the interior. Unless disappointed in the strong immigration now going in that direction, this city will grow very rapidly. When the expedition passed, in June, 1897, the place was very quiet and the few inhabitants seemed to be unoccupied. Besides the few white people, there were a good many Indians loafing around,—dirty, with faces colored and hair hanging over their shoulders. Only two months afterward, the expedition returning found the city very lively, full of an excited crowd in a ferment from the discovery of the Klondike.

From Juneau the boat goes up to Glacier Bay, and, over the blue sea, full of large blocks of ice which appear to be marble tombs of a large cemetery, emerge two great ice docks. To the left appears the imposing peak of Mt. Fairweather, and to the right, at the end of the bay, the Muir Glacier, from the walls of which fall, at intervals, masses of ice, which plunge into the sea with a deafening sound. From accurate measurements made by G. F. Wright, the center of this glacier moves with a speed of twenty yards a day.

The 20th of June, the expedition landed at Sitka, situate on the island of Baranoff, with a natural bay covered with islands and rocks and opening on the ocean. Sitka is the limit where the regular navigation stops, and there the archipelago which surrounds the coast stops also, between the fifty-eighth and fifty-ninth parallels. From this point there extends to the northwest a bare coast, and in a length of 300 miles there is only one bay of importance,—Yakutat.

All the rest of the coast is exposed to the stormy sea, and is very dangerous to approach. This part of the Pacific is navigated once a month by the steamers of the Alaska Commercial Company as far as Cook's Inlet, where commences the great peninsula of Alaska to which is attached the chain of the Aleutian Islands separating Behring Sea from the Pacific Ocean. On one of these steamers, the "Bertha," the expedition left, the night of the 20th of June, with the "Aggie" in tow, having our guides and the ten American packers under Major Ingraham. The trip was far from good, and the weather did not allow the sight of the mountains to be enjoyed.

To the north of Sitka, and beyond the opening of Cross Sound, the coast is straight, without any bay, bordered by bastion-like rocks hanging over the sea, behind which are the imposing tops of Mt. Crillon, Mt. Fairweather, and Mt. La Perouse. Then are seen the great Pacific glaciers, plunging into the ocean, and after some fifty miles begins to appear the top of Mt. St. Elias, which seems to emerge gradually from that sea of ice. One understands how every navigator has been impressed by such a sight, and especially why St. Elias has attracted the attention of so many daring mountain climbers.

Around, isolated from St. Elias, toward the east, appear also, in their magnitude, the tops of Mt. Augusta, Mt. Logan, Mt. Cook, and Mt. Vancouver.

At 10:30 of the night of the 22d of June, the "Bertha" with the schooner "Aggie," reached port Mulgrave on Yakutat Bay, opposite the Indian village, and was received by the cheering natives gathered at the landing, and the terrible barking of the innumerable dogs. The village has perhaps twenty wooden houses, which are all small cabins.

There are here four or five white people, among them Rev. Hendriksen, a Swedish missionary, who is much inter-

ested in meteorology, and who took charge of the two barometers left there by the expedition.

A few hours after the morning of the 23d, the "Bertha" left Port Mulgrave with the "Aggie" in tow, and crossing the bay, landed on the coast of the Malaspina Glacier. This glacier has its head at the apparent foot of the mountains above named, has an average elevation of 300 yards above the sea, and is about fifty miles long by thirty in width, with an approximate surface of 1776 square miles. The front line of the glacier extends along the coast for ninety-four miles, and is separated from it only by a narrow strip of forest, which appears here and there covering it with quite a rich vegetation. The coast is bare, save only at a few points, and at one of these points the ice extends to the sea. From this immense extent of glacier run many rivers and creeks, which bring to the sea a large quantity of debris.

Four expeditions had before attempted the ascent of Mt. St. Elias. The first, in 1886, sent by the *New York Times*, included Professor Libby, F. Schwatka, and H. W. Seton-Karr. The second, in 1888, included E. H. and Harold W. Topham, G. Broke and William Williams. Both landed on the Pacific coast, opposite Chaix Hills, the landing being on the Malaspina, to the southward of St. Elias, and they tried to reach the top from the west and the south. The first expedition reached only 7511 feet. The second reached 8154 feet, but both had to abandon the attempt, as the slope selected was too steep, and also on account of the lack of good packers and sufficient provisions.

The other two expeditions, both directed by Professor Israel C. Russell, were organized by the National Geographic Society and by the U. S. Geological Survey, in 1890 and 1891. The first year, Russell landed at the end of Yakutat Bay, at the foot of the ridge which comes from the eastern part of the Cook chain, and keeping along the base of it on

the boundary between Malaspina Glacier and the glaciers tributary to the chain, he reached the Hitchcock Hills, and through the depression of the Pinnacle Pass, the Seward Glacier, and then, crossing the Dôme Pass of the Samovar chain, he reached the Agassiz Glacier. From there he had before him the natural road of the large basin of the Newton Glacier to the top, but bad weather, due especially to the season being late, compelled him to return when he was almost at the foot of the mountain.

The next year he made the attempt again, landing on the Pacific coast where Schwatka and Topham had landed. The heavy seas were the cause of a wreck which cost the lives of six persons. Crossing the Malaspina, he climbed the glaciers of Agassiz and Newton, to the base of the Pyramid, and the morning of the 24th of July, 1891, he left the last camp, with two companions, to attempt the ascent. With great fatigue, cutting the steps on the steep wall of snow which closed the end of the Newton Basin, he arrived at noon on the hill between Mt. St. Elias and Mt. Newton, 12,284 feet above the sea, and began to ascend the ridge of snow which extended directly from the hill to the top. At 14,432 feet of altitude, he had to renounce the attempt on account of the late hour and the threatening weather. Wet to the bone for many days, badly protected from the snow in poorly-made tents, exhausted physically by the continual work, and impressed by the gigantic avalanches falling from such a steep wall to the valley, he decided to wait for good weather, and finally abandoned the attempt; so returning to the coast where he had landed, he followed the edge of the Malaspina Glacier, exploring the immense coast to the end of the bay of Yakutat.

These two explorations convinced the scientists that Mt. St. Elias was not a volcano, but a mountain formed of crystal rocks. Accurate triangulation and hypsometric determination of the principal peak resulted in forming a very good

map, which was quite useful to the Prince, and will be so to any future expedition.

Having explored all the coast of the Malaspina, Russell could indicate the best point for landing, and it was by his advice that his Highness landed on the west coast of the bay, a few miles north of Cape Manby, near the mouth of the Osar River. From this point the itinerary already planned was followed punctually. First crossing the forest and the large frontal moraine, a distance of eight miles, then traversing the Malaspina obliquely, and reaching the foot of the Hitchcock Hills, twenty-three miles farther, the expedition went up to the Seward Glacier, along the west side of the hills, until it reached the ridge which borders the north part of the Pinnacle Glacier, ten miles from the Hitchcock Hills. From this place, crossing the Seward and Dôme Pass, which is a depression of the chain of the Samovar Hills, they reached the eastern edge of the Agassiz Glacier, climbing the long valley of the Newton Glacier, a distance of twenty-two and one-half miles. This is dominated by a snowy hill, from which a ridge of ice with moderate inclination reaches St. Elias, and it is over this ridge that the expedition reached the top, returning on the same road.

One hour after leaving the little Indian village on the morning of the 23d of June, a thick fog compelled the "Bertha" to stop in the middle of the bay, where the expedition had to wait impatiently until after two o'clock P. M., when the atmosphere began to clear up and the coast appeared with its line of trees.

Far away could now be seen the base of the Cook chain, with its icy block-tributary of the Malaspina filling up the valleys. The expedition approached very prudently to explore the coast, and at five was at the mouth of the Osar River. Umberto Cagni, who was exploring the coast,

found the landing possible, and the unloading of the steamer began at once. At eight o'clock the Prince left the schooner, and in a few hours, upon a sandy elevation on the border of the Osar River, the first camp was established, and at night the expedition tried to take rest, notwithstanding the furious attack of the numerous and ferocious mosquitoes. The schooner left the same night for Port Mulgrave to wait for the return.

Fifteen days before, another expedition under the direction of Professor Bryant of Philadelphia had landed at the same point.

About three miles of forest separated the camp from the ridge, and on the morning of the 24th, the Prince, heading a small party, went ahead to find a practical road. The other members, left to the care of the tent, put away safely the reserve materials which were to be left on the coast, and began to form the different packs, which had to be carried by the packers to the foot of the ridge, across the confluence of the Osar River, over a bridge naturally formed by the trunk of a tree. The road ran along the right side of the river, now in the sand or in the gravel of the large bed of the river, now at the edge of the forest, under large trees or in thick bushes, or through the rich vegetation of the ferns which grow under the pines, over a level plain made soft by the ferns and mosses with which the trunks of these conifers are covered. Hawks, crows, magpies, geese, seagulls, and many small birds made the place very lively with their cries.

There were some footprints of bear, but the expedition had no time to lose. The second camp was established at 150 feet above sea-level, on the edge of the ridge, which is bare and full of mud and stones, with some blocks of granite. Crossed by small creeks and ponds, the bottoms of which are of very fine sand, this ridge is about four miles long, and ends abruptly at 492 feet above the sea-level,

with a very neat edge cut towards the glacier, yet covered with a thick layer of snow.

For six days the work was directed with great ability by the Prince, and on the night of June 29th all of the provisions were brought to the edge of the glacier, with the help of four Indians who afterwards left for Yakutat, carrying the last letters.

The sleds are ready, but a trying trip is anticipated on account of the soft snow. Upon the sleds is packed food for sixteen days; three large Whymper tents; two small Mummery tents for high mountains, with waterproof which keeps the bottom dry; a black tent for the photographic work; a sack-bed blanket of feathers, which they use on a very light iron folding bed, extending eight inches from the ground; two aluminum coal oil stoves, such as were used by Nansen, and two alcohol stoves, which can be quickly lighted during the march. Every member has a sack which contains a complete suit of clothes. Vittorio Sella has two large photographic machines. The expedition carries two mercurial barometers, two large aneroids, psychometer, hygrometer, compass, inclinometer, alcohol and mercurial thermometers, hypsometer, field glasses, sanitary provisions, smoked spectacles, manilla ropes, wooden litters, such as were used by Sella on his trip to the Caucasus, which are to be used where it is impossible to use the sleds.

The food is divided into daily rations. A tin box and a sack, weighing together forty-six pounds, contain all that is necessary for ten persons in one day—crackers, canned meat, paste for soup, Liebig's extract, butter and lard, condensed milk, sugar, tea, coffee, half a pint of rum, chocolate, dried and canned fruit, cheese, salt, pepper, soap, matches, three candles, coal oil and alcohol. The American packers were provided in about the same way by Major Ingraham. Altogether the expedition carries on the four sleds a weight of 635 pounds.

The expedition leaves the ridge on the first day of July at 3 A.M. The temperature is two degrees centigrade, and the atmosphere clear. The immense white glacier of Malaspina extends as far as the sight. To the right, from the Cook chain, come different slopes, forming between them valleys full of ice; and in front, about twenty-five miles distant, stands Mt. Augusta at the entrance of the Seward Glacier, which falls in a cascade over the Malaspina, through a bed made by the Hitchcock and Samovar Hills on either side. Behind all these stands, like a gigantic pyramid, Mt. St. Elias.

The expedition leaves the rocks with emotion, for there is before it the unknown expanse of snow and ice, an icy ocean to which there is no limit. What will become of the goods left behind if the rain and the snow should fall incessantly? But there is no time to think of emotions, and there is the little camp of green tents to rest the eye from this immense solitude. The tents are generally set in picturesque disorder, being arranged only so as to turn the openings away from the wind. If the snow was soft, it was soon made hard by the feet, and in a few minutes after stopping and unloading the sleds, the camp was formed, the coal oil stove set to burn, and soon the soup was boiling. During the cold and rainy days the cooking was done under a tent, and after the meals a siesta and a little conversation were the only distractions.

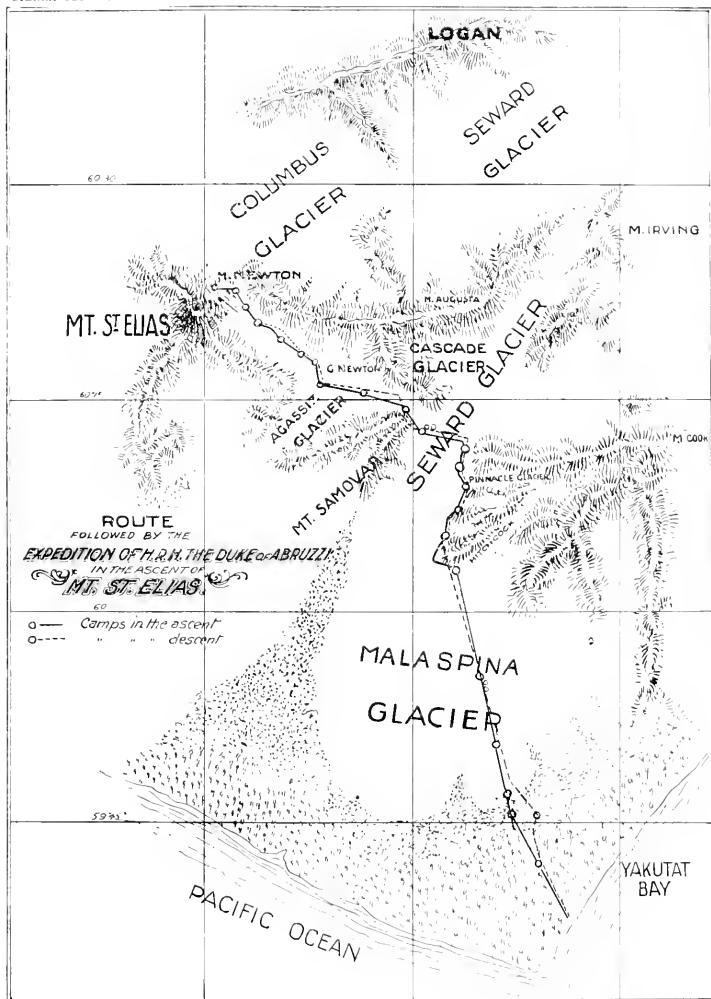
It takes three days to cross the Malaspina Glacier. The sleds being very heavily loaded and the snow soft, it requires the strength of all the expedition to proceed. A thick layer of snow covers everything, so that it is impossible to see the crevasses. The surface is undulated in long ditches, with an inclination, gentle, but perceptible enough to the men pulling a sled, and besides, the bottoms of many pond-depressions where the snow was melted is an impediment to progress. Many narrow creeks run over

the ice between the two borders of the valley, and they are crossed with bridges made with the picks. The panorama is monotonous but grand. After the first brilliant, sunny day, follows fog and a little rain, and then his Highness, at the head of the expedition and connecting the others with the ropes, has the unpleasant task of directing with the compass the progress of the party, which is rendered perfectly desolate by the persistent fog.

On July 3d, at 3:30 P. M., after ten hours of marching in a dense fog, the members of the expedition, fatigued and wet, arrived at the Hitchcock Hills, and were pleasantly received by a flock of white mountain quail, which rose from the few bushes covering the steep hill.

The party is now at the foot of the Seward, and pitches its tents on the snow at 1676 feet above the sea level. It is the seventh camp since the departure. The next day, the 4th of July, the Prince takes a rest, in honor of Independence Day and of the American packers who are rejoicing on their national anniversary. They were a curious group, those packers, and very difficult to describe. Five were students of the universities in science, in letters, and in philosophy. Four were mariners and among these a professor of Latin and Greek, and our poet. They all worked well and with enthusiasm, following diligently the direction of Major Ingraham, who did more than could be expected for the good success of the enterprise. Independence Day was employed by the guides in studying the ascent of the Seward.

Crossing the left ridge, among the ice and rocks, the party reaches the front where the cascade of the Seward runs into the Malaspina. Between the masses of ice and the extreme peak of the Hitchcock Hills there is a steep fall, full of snow, about 328 feet high. This bastion the guides begin to attack with their picks, and before noon of the 5th, through a trail made in zigzag form, the expedition has





reached the top of the Seward, facing a large amphitheater crowned by the tops of Augusta, of Matasona, and of St. Elias.

If the Malaspina is a great calm lake, the Seward is a stormy sea, about seven miles wide and a chaos of disorderly piled-up masses. To the steep walls of Augusta and Matasona are attached masses of ice-like snow, and far behind is plainly visible St. Elias, with its northern ridge, over which the climb must be made. The undertaking does not look difficult. The proportion of the surrounding panorama is so great that the top of the mountain looks small, and one cannot yet realize how high it is. Capricious spots of fog hang over the different peaks, moving and giving to the sky the different colors of the rainbow and producing a magnificent effect. The condition of the glacier compels the expedition to attack its left flank, sometimes dragging the sleds over the plain formed by the snow, sometimes carrying them on the shoulder and across the sudden undulations of the ice. The party is reduced by five American packers, who go back to bring the food from the last camp on the Malaspina.

The 8th of July, passing over the snowy creeks and a few spots covered with herbs, with some violets and anemones, the expedition climbs a glacier which, coming from the Pinnacle Pass, extends to the Seward, surrounding a spur of the Hitchcock foothills. This large surface is crossed with the sleds, and the 9th of July a camp is set at 3178 feet above sea level, on a small hill at the north foot of the Pinnacle. It is the twelfth camp, and it has taken sixteen days to reach this low altitude.

The expedition is now thirty-five miles from the coast. Near this camp on the rocks at the top of the hill there is found a fragment of tent and some stones piled up as a signal. They are the only traces of human beings found on the trip, left in 1890 by the first expedition of Russell while descending the Pinnacle Pass. The expedition

gathers many conglomerate rocks and some fossil shells among the round pebbles and the sand on the top. At this point the American packers leave the party, and under the direction of Major Ingraham, form a chain to bring food from the Malaspina to a point half way up the Newton Glacier. The Prince personally supervised this important service, and the provisions were punctually carried to the place.

The Seward Glacier is so split that the expedition crosses only with difficulty, the 10th of July, after a reconnoitering movement made by the Prince himself. The sky is overcast, the temperature mild, and the snow soft, and it is difficult to proceed over dice-like blocks of snow. Fortunately, they are hard enough to support the weight. There are no blocks of true ice, but of snow of different thicknesses, and at the base of Mt. Owen and Mt. Augusta there is a layer of *Arenaria* belonging to the Samovar, above which is an immense valley covered with ice, reaching the Dôme Pass at an elevation of 3936 feet above the sea-level, and behind appear the beautiful peaks of Mt. Owen and Mt. Irving.

The top of the pass is reached on the 12th of July, in the fog and a little mist, and the next day camp pitched on the edge of the Agassiz Glacier, at 3480 feet above the sea level. It is the fifteenth camp and the foot of the true mountain. At this point the expedition leaves the last sled and everything which is not absolutely necessary.

The Newton Glacier, seven miles long and from two-thirds of a mile to one and seven-eighths miles in width, has three sides, and the wall of the valley, full of snow, is surrounded by magnificent peaks of ice hanging over and covered by fresh snow. It takes thirteen days to reach the top, forming six camps and stopping every mile and a quarter, fighting the snow, which is falling almost continually, blinded by very thick fog, and walking with great

fatigue over the snow in which the members sometimes plunge to the hips. The scene is terrifying among those blocks of ice, over bridges of snow not always steady and with the continual noise of the avalanches of snow, mixed with stones, which are falling day and night. Of thirteen days, only three were tolerably clear, and during these the panorama was really enchanting, with its different colors changing at every instant, and with a characteristic indigo-blue, very different from the coloring of the Italian Alps. These glaciers differ from those of the Alps in that the stormy weather in Alaska is not dangerous, and the thunder is not heard mingled with the noises of the avalanches. It is impossible to realize the difficulties of this last trip among the immense crevasses covered by snow, where the passage is dangerous, and where the members sometimes plunge to the shoulders; and here the guides show their ability in digging and pounding the snow, with great fatigue, to make a trail.

Half way up the glacier the expedition leaves one tent and all the iron folding beds, and there, for the first time, hears through the packers, of the party of Bryant, whom they had met on the other side of the Newton, he having renounced the further ascent on account of the sickness of one of his men.

On the evening of the 28th of July, with the sky in part clear, the expedition leaves the last camp on the Newton, the twenty-first one, at 8958 feet altitude. In front stands the pyramid of St. Elias. The 29th of July, three guides advance to cut steps on the wall of the hill, and the Prince goes back to bring some food from the last camp. The evening is very clear and every one of the expedition is enthusiastic and ready for the approaching last attempt. They leave at four o'clock on the morning of the 30th, with two tents, the bed blankets, two and one-half days rations, one coal oil and one alcohol stove, all the instruments

and the two photographic machines. The snow is a little harder. The morning is very clear, and the expedition crosses as rapidly as possible the space almost brushed over by the previous avalanches, and in an hour and a half reaches the foot of the wall and there begins the ascent of that steep bastion. At first Sella slips down, and then a guide loses his coat and fifteen minutes are lost in recovering it; and after climbing over the shoulder of the guide in many instances, they reach the top of the ridge and camp at 12,284 feet above the sea level. This hill stands on the south of the large ridge of St. Elias, and at the north of the snowy ridge of Newton. At its foot lies the great ice valley of Newton. The atmosphere is so clear that the far-away sea and all the peaks around—Iring, Vancouver, Augusta, and Cook—can be seen. From St. Elias, and from the rocks of Newton, continual avalanches of snow and ice and stone fall with tremendous noise. The sun-setting is beautiful. The sky is steel-blue, the rest of the horizon orange-red, and Augusta looks like a volcano in eruption. The temperature, eight degrees below zero centigrade, and a cold breeze compel the members to retire under the tent. The nights are a little longer, but longer still are the exciting thoughts of the next day's undertaking. They are all up at midnight, and after a good, boiling cup of coffee, they form the last pack,—a few rations for one day, the mercurial barometer, two aneroids, the igrometer, the alcohol and mercurial thermometers, and the two photographic machines.

The night is very calm, very clear, and Venus brilliant over the top of Newton. The members are divided into three divisions. His Highness, Cagni, the two guides Petigax and Maquignaz, and then Gonella, between Croux, and Botta, and last, Sella with De Fillippi and Pellissier—all silent, evidently moved by the realization of this hard undertaking; every one intensely conscious of this last



MOUNT ST. ELIAS

From a photograph by Isaac C. Russell



attempt, consulting the barometer and the direction of the wind every instant. The last ridge is split with a cut in the ice, and the fresh snow is very fine, leaving at intervals an uncovered space of hard snow, in which the guides cut the steps, Petigax and Maquignaz at the head, relieving each other every hour, while the members ascend as rapidly as the way is open. Soon, across the cut in the ice, the snow is not so soft. The day clears up and the peaks look silvery. Very fine snow blows in their faces at intervals, while the first rays of the sun gild the top of Newton, and about twenty miles distant emerges the imposing peak of Logan. The ascent is made in very calm weather, with an ideal temperature, rare in the mountains, without perspiration or cold.

After crossing the second rocks, over a kind of black island, the instruments are disposed for observations by Cagni. The temperature is eight degrees below zero centigrade. All around is white and brilliant with pearly color. They are now higher than the top of Augusta, can see the great mass of Logan to its base, and an immense sea of ice, the largest after the Malaspina, circumscribed at the south-east of St. Elias, extending at great length on the horizon. The atmospheric pressure begins to tell on the members of the expedition, with some nausea, palpitation, and the usual fear of not being able to reach the end. At nine o'clock, at 16,400 feet of altitude, the Prince makes a halt and the party breakfasts. The march becomes now very fatiguing. One after the other feels the effect of the rarefaction of the air, with some headache, difficult breathing, and general weakness.

The Prince at the head leads the way, and proceeds cautiously, trying to keep the men all together. The ascent is uniform, without difficulty, but notwithstanding that, begins to affect everyone with the exhaustion which precedes the end of a serious undertaking. Every step

seems to be the last, and every fifteen minutes the party is obliged to stop for five or six minutes. All at once appears the great point covered with snow, and the members hasten up, taking breath every ten minutes. They follow each other perfectly exhausted and unconscious yet that they are there. One hundred and sixty feet from the top, Petigax, who is at the head, stops to give way to the Prince, telling him, "It is for you to touch the top first, as you deserve it by your perseverance." His Highness steps to the top of St. Elias, and all the others run, anxious and exhausted, to join him in the hurrah. The victory is complete, and it is all Italian. All ten have accomplished the purpose for which they left their own country.

No one can describe that moment. Many of those men, who for thirty-eight days had struggled to stand the trying ordeal, sobbed like children. Their anxiety, their exhaustion, the palpitation, disappeared in that moment of enthusiasm. It was 11:45 of the 31st of July, and the Italian flag was waving, hanging to a post, while the little crowd stood cheering Italy and the King.

The temperature is twelve degrees below zero, centigrade. The mercurial barometer points to 385 MM., and with the correction shows an altitude of 18,086 feet above the sea level, closely approximate to that of 18,080 feet, calculated in 1891 by Russell with triangulation. All the other determinations were erroneous. The only one which approached it was the one taken from the sea in 1792 by the Italian navigator, Malaspina, of 17,843 feet.

The ascent lasted ten hours and a half, climbing 5802 feet. According to the calculation of his Highness, deducting from the total time only half an hour lost in making observations and half an hour for breakfast, in the first five hours there were climbed 3310 feet, with an average of 662 feet to the hour, while the last four and a half hours only 2391 feet were climbed, with an average of $531\frac{1}{3}$ feet to the hour.

The horizon was beautiful and very clear. At 1:15 P. M. the expedition started back, and at five the party of the Prince, which had preceded, stopped for the other, and the next day, the first of August, without incident, the expedition reached the Newton, and the 3d day of August met again the American packers who were waiting. It was snowing, but notwithstanding that, the descent was very rapid. His Highness had arranged so that food was well distributed all along the road, and every day the expedition could make three of the previous camps, removing all that has been left. The snow was very soft and everybody plunged to the hips, so that walking was very painful. The bridges were less sure and the crevasses more frequent. The 5th of August the expedition left the valley of the Newton and the noisy rumbling of the avalanche, and the tedious trip on sleds along the Agassiz over the Dôme Pass became almost unbearable on account of the soft snow which covered everything. Between the 6th and 8th of August the expedition crossed the Seward, with snow, rain, fog, and sun only at intervals. No accident happened, thanks to the ability of the guides in dragging and carrying the sleds, which excited the admiration of the American packers.

The winter coat of the Seward which was thick with snow one month previous, has disappeared; the snow is melted, and waterfalls with small blocks of ice are seen, and rich blossoming vegetation. The 8th of August camp is set on a depression of the Hitchcock ridge, and the next day the expedition reaches the Malaspina plain. A different sight greets the eyes of the members, because the Malaspina has changed its appearance and a part of the snow melted and many crevasses opened, rendering the road very tedious and difficult; so much so that for a long way they are obliged to walk in the muddy snow to the knee. The trace of the sleds cannot be found, and the Prince is obliged to head the caravan with a compass, so as

to reach the coast at the same place where they had disembarked. At 1 P. M. of the 10th they are in view of the Bay of Yukatat, where the "Aggie" arrived in the morning from Port Mulgrave, and is in waiting under full sail. The arrangements made by his Highness were perfectly correct, as he had ordered the schooner to be there between the 10th and 11th of August.

In six hours the bare surface of the Malaspina was crossed with the sleds, running very rapidly, only at intervals receiving some shock by the unseen crevasses; and after crossing the three ridges and pulling the sleds with all their force, the party stopped, tired of the long march, between the rocks and the mud of the last ridge, near some provisions which had been left by the last camp of the Bryant expedition. For the first time they slept on stone, after forty days of life spent on the snow. They had descended in ten days over all that zone of glacier which it took thirty days to cross before.

At noon of the 11th began the embarkation, and on the morning of the 12th, at 8 o'clock, the Prince left the landing. They spent the forenoon at Port Mulgrave, and the morning of the 13th of August they left, under full sail, for the return. The weather was beautiful, and the majestic chain of mountains splendid under the rays of the sun. After four days of rest on the deck of the schooner, they reached the Bay of Sitka, the 17th of August, fifty-seven days after they had left it.

The return to Europe was rapid. [First on the "City of Topeka" to Seattle, and then across Canada to Niagara Falls and to New York, whence they left at 11:30 A. M. of the 4th of September on the "Lucania."

The party dissolved in London on the 11th of September, after four months of companionship.



ABBOT PASS, FROM FOOT OF MT. NICHOLS



THE SUMMIT RIDGE OF MT. LEIFROY FROM SOUTHERN TURRET.



ON MT. LEFROY, AUGUST 3, 1897.

BY C. S. THOMPSON.

In the early spring of 1896, Mr. Philip S. Abbot invited his friend, Professor Harold B. Dixon, of Owen's College, Manchester, Eng., to climb with him, at some future day, among the Canadian Rockies. In consequence of that invitation, and its delayed acceptance, there is now, on the southern end of the summit ridge of Mt. Lefroy, overlooking certain cliffs, a small, hastily erected cairn. Thrust into a crevice, between two foundation stones, is a brass pocket match safe, containing a soiled, much-folded slip of paper, upon which is written: "On the summit of Mt. Lefroy, Aug. 3d, 1897: H. B. Dixon, J. Norman Collie, C. E. Fay, Arthur Michael, C. L. Noyes, H. C. Parker, J. R. Van Derlip, C. S. Thompson, Peter Sarbach, guide."

About three o'clock in the morning we pulled away from the wharf in front of the Lake Louise chalet. The night was dark, clear, and cold, almost frosty. To right and left before us were the profile masses of the Beehive and of Goat* Mountain; between them, up the valley, the ghostly white shapes of Mt. Lefroy and Mt. Green; behind, the lonely chalet and the radiance of the morning star. The all-including silence was broken only by the creaking of the rowlocks and the steady dip of the oars in the quiet water. At the

* The Canadian Topographical Survey has recently changed the name of this mountain to "Fairview," and has expressed a preference for Mt. Victoria over Mt. Green, and for Lefroy glacier over Green glacier. For the sake of uniformity with a preceding article in the *Sierra Bulletin*, I use in this, when necessary, the older names.

head of the lake we landed on a small alluvial delta, over which we moved, splashing and stumbling in the deceptive candle-light of two folding lanterns, toward a belt of woodland crossing the valley. I was somewhat in advance of the others, and in the darkness, treading with a certain familiarity through underbrush and over moss-covered stones, I separated entirely from them. Beyond this last stretch of woodland, following a dry stream bed, I picked an easy way among boulders, distinctly visible in the growing twilight. The air freshened with the coming morning, the color slowly crept into the shadowy grass and trees, the details of glacier and precipice grew upon the mountains, the great eastern face of Mt. Lefroy was once more gray. Strangely enough, there was no sound of bird or animal, only the sibilant rush of the glacial stream, and, on the right, over my shoulder among the alders, the just audible voices of my companions. They had skirted the belt of woodland, had crossed the stream, had found the well-cut trail, and were now rapidly rejoining me.

Above the snout of the nearly level glacier, which here begins to fill the floor of the valley, the party gradually divided. Collie, Fay, and Van Derlip pushed forward along the top of the northern lateral moraine; those left behind soon turned, under the guidance of Sarbach, upon the rock-strewn ice. By this change we would, in ordinary seasons, have outstripped our more swift-footed companions. This summer the warm July rains, abnormally heavy, had melted the hitherto abundant snow bridges, so that by the time we reached the very moderate ice fall which marks the open end of the frozen amphitheater at the head of the valley, we were involved in an apparently endless maze of crevasses. Skirting these—to right, to left,—cutting an occasional foothold on their nearest margin, we jumped, with no downward glance, from one sland of ice to another. Once only, we tied ourselves to

the rope and thus were safely jerked forward one by one, in midair leap, by Sarbach, who had gone before us to the farther side. Some distance ahead, Collie, Van Derlip, and Fay were dancing to the same tune.

Beyond the crevasses, where the early spring avalanches from the encircling mountains pound the glacier into a solid mass, we turned gradually southward, toward Abbot Pass. Four thousand feet above the sun was shining upon the upper snows of Mt. Green; with us, between the remarkable walls that guard the entrance to the lower slope of the pass, the air, cold and damp, was still gray with the last traces of the dawn. Our ascent was never easier; first, over two terraces built of a rubble of ice blocks, cemented by their powdered fragments, then over a third, covered with a fresh snow that effectually blocked all crevasses. As we rose, the unforgotten western face of Mt. Lefroy came fully into view. There, again, was the familiar ice slope, divided vertically into three streams by intermittent buttresses of curiously rotten limestone. The angle of ascent, modified, doubtless, in memory, seemed steeper; the covering of fresh snow, concealing the grayer ice, except in two places, promised a safer, less difficult climb, than that of the year before. We ate a second breakfast, seated on the scree at the summit of the pass.

Here our more serious work began. Dividing into three groups, each group upon a separate rope, we turned directly up the face of the mountain, at right angles to our former course. For some now forgotten reason, our rope, on which were Collie, Parker, and myself, was detained in the pass several minutes after the departure of the others. Following up a small hill of great stones piled against the mountain, we came upon the snow slope directly under the southern line of buttresses, toward which our friends, under the guidance of Sarbach, were slowly rising. The snow, dry but compact, gave good footholds—needful, for the slope was

as steep as the steepest house roof, and growing steeper. Passing to the right of the lowest and most isolated of the buttresses, we came shortly to the second, readily surmounted by a narrow ladder of snow held between it and a satellite ledge upon its right flank. From the top of this improvised ladder, keeping always on the northern edge of the most southerly of the three ice streams, the one along whose farther margin we had labored so desperately just a year before, we held a steady course upward to the third buttress. There the two leading ropes, following Sarbach, had changed snow for rock, and with much caution, were edging up its shattered face. Even with their utmost care, two or three stones flew by us and ricocheted down the slope. Swerving again to the right, partly to avoid the missiles, partly because we judged this course the easier, we kept determinedly upon the snow. Accordingly, when the others returned to the margin of the ice stream at a point somewhat below the foot of the fourth buttress, we fell into line ahead of Michael, Noyes, and Van Derlip, and directly behind Sarbach, Dixon, and Fay. No place in all our climbing required greater care. We were standing, one above another, on an ice slope covered with less than two inches of snow, and exceedingly steep, so steep that at times it seemed as if Collie's shoes would graze my face. Below, the snow-covered ice, slightly concave, fell like an admirably adapted chute toward a precipice overlooking the gorge beyond the pass. Above, there was the sound of Sarbach's ice axe, step-cutting, and, out in the center of the ice stream, a grim patch of gray, glistening in the surrounding white. Upon such a slope our movement was necessarily slow. Time and again, in the leisure of those moments, I looked across that narrow ice sheet to a line of low broken ledges, the path of our last year's party, the path that we too must have taken but for the favoring snow. The cliffs where Abbot fell were very near, and the chimney

up which he so resolutely climbed was fully in view. Somewhere at its top, at some point plainly visible, the friable rotten limestone had cracked beneath his hold. I lived that day again.

Above this fourth buttress the snow, most fortunately, became deeper, but the angle of the slope, instead of moderating, as we had expected, became disappointingly greater.* We clung to the mountain side like flies. Once more Sarbach's rope decided that rocks were better than snow, and forthwith assaulted the fifth buttress, the highest and least formidable. To this point our path had been not more than fifty feet south of the continental watershed in British Columbia; now, traversing a band of snow below the buttress upon which Sarbach's party was scrambling, Collie, Parker and I crossed to the southern margin of the middle ice stream, in the territory of Alberta,† and moved upward thereon. The end was at hand. Resting on our axes until Sarbach could resume the leadership, we again followed, still always upon the snow. As we went, we passed a stone loaded with frost feathers. It had been a winter's night upon the summit.

A ridge, or razor edge, over which the snow swept in cornices that overhung the precipices of the eastern face; at either end a low turret, like a crumbling chimney on the roof-tree of an old manse: this is the summit of Mt. Lefroy.‡ Toward the southern turret, where the watershed turns abruptly from ridge to pass, Abbot, Fay, Little, and I had gazed with unsatisfied desire half a summer's day. Upon it our party now gathered — thirsty, tired, silently triumphant. There we remained, seated astride, from twenty minutes past eleven until half-past twelve.

As far as the eye could see through an atmosphere

* Collie estimated the angle of the slope at 65°.

† On this face of Lefroy the line of division between the watersheds is almost imperceptible, and, at times, difficult to determine.

‡ Barometric altitude (mercurial), 11,425 feet.

unsurpassedly clear, there were mountains beyond mountains, without end. Among them we recognized familiar shapes, Hector, the great ark Assinniboine, and the towers of Goodsir; nearer, the pyramid of Temple, and Hungabee, the chieftain, with his ten men, Heejee, Saknowa, Sagowa, Neptuak, and all the others curving in Indian file behind him. Across the hidden valley of the Columbia, southwestward, were the vast snowfields of the southern Selkirks, yellow in the distance. For a radius of a hundred miles the world was ours, a wilderness of uncultivated valleys, of peaks and glaciers.

As the sun was slowly changing the snow on the western slope into a granular, treacherous mass, which slides upon such an inclination with the slightest disturbance, like flour or finely bolted starch, there was some danger in remaining long where we were. Sarbach, Dixon, and Fay were the first to move, returning, as they had come, by the face of the fifth buttress. Curving by this upon the snow, I saw Sarbach, like a nineteenth century Porthos, seated at the top of what, by courtesy, might be called an exceedingly shallow chimney, his feet braced like a divided pair of compasses, around his waist the knotted end of an Alpine rope, along whose extended length Fay and Dixon performed most circumspectly all manner of unexpected contortions. Then our own footing demanded immediate attention, and for more than an hour they were hidden from our view. We moved, one at a time, backwards, as if going down a steep ladder, pounding our feet well into the softening, but easily compacted snow, and at each step driving in the handles of our axes almost to the head. The passage down the ice steps, the engrossing nature of our occupation, and the exhilaration of the descent, after a successful ascent, prevented this mode of progression from being wholly monotonous. I admit, indeed, a slight feeling of regret as we faced about at the

foot of the lowest buttress and glissaded to the pass. There we variously disposed of ourselves. Collie crawled to the end of a rocky promontory jutting into the Pacific Slope, where he closed his eyes in apparent slumber; Parker busied himself with photographic and other scientific observations, while I cut bits of fat and portions of the browned salted exterior from a roast of mutton, and ate them ravenously. Half way up the mountain, certain small black figures were moving imperceptibly downward. An hour later we were all once more safely on the pass.

There is little more to tell. Leisurely, much behind the others, Collie, Parker, and I descended to the Green glacier, and crossed it to the foot of Mt. Nichols. There, on the highest point of the lateral moraine, not far from the spot where our party of August 5th in the preceding year had finally left the ice, we sat down to rest. On that day, looking back, I had watched a sudden rain squall drive across Abbot Pass, hiding it behind a veil of streaming gray; now I saw it, as never before, in the dazzling beauty of a sunny afternoon. The three years' struggle with Mt. Lefroy was finished.

CONIFERS OF THE PACIFIC SLOPE—HOW TO
DISTINGUISH THEM.

BY JOHN G. LEMMON.

No. 2.

Our first number treated of the general classifications of the great order of *Coniferæ*, followed by groupings and descriptions of a little over a third of them,—the *Fasciculars*—Pine, Larix, and Cedar.

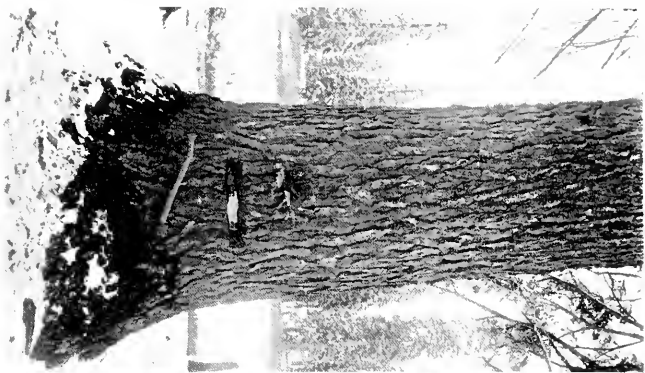
This article continues the classifications, grouping and describing the other subtribe of Northern Pitch trees—the *Solitares*—including the Spruces and Firs. Then follows a discussion of the tribe of *Taxodiads*, including the *Sequoia* and its allies.

The Whorl-cone Conifers, the second great division of the order, and embracing the so-called American Cedars, the Cypressess, and the Junipers,—supplemented by a discussion of the *Taxaceæ*, or drupe-fruited trees (by some authors referred to the Conifers)—will remain for a third article.

SUBTRIBE B. SOLITARIÆ.

THE SOLITARY-CONED PITCH TREES—SPRUCES AND
FIRS.

Very resinous and evergreen trees of the Northern Hemisphere, with all the leaves solitary, not in fascicles or tufts, and all very short; male flowers solitary, spike-like, or globular; cones maturing in one season, with two seeds upon each scale, mostly broadly winged. Separated by the position and direction of the cones into two classes—Pendant-fruited and Erect-fruited Solitaires.



SHASTA FIR—*Abies—Shastensis.*

DOUGLAS SPRUCE *Pseudotsuga Inconspua*

From photographs by John G. Lennon.



CLASS A. PENDENTES—PENDANT-FRUITED SOLITARES.

THE SPRUCES.

Beautiful evergreens, yielding tough timber; cones small, elongated, pendant from or near the ends of the branchlets, not confined to the upper limbs, but borne by any of them; scales persistent upon the axis, like those of the pine, not deciduous like the true fir, the edges thin, rounded, not bearing protuberances or prickles, a thin, flat, leaf-like appendage (bract) attached to the back of each; spikes or heads of male flowers solitary, terminal, or scattered. Three (or, with *Hesperopeuce*, four) genera, in two sections:—

SECTION I. INCLUSÆ—NAKED-CONE SPRUCES.

Cones terminal or next to a terminal leaf bud, the small, undeveloped bract included by the growing scales; leaves promptly deciduous in drying; branchlets roughened by the coils of short, peg-like, ligneous leaf-bases (*pulvina*), left by the falling leaves—this latter character readily revealing the trees of this large group. Two genera:—

THIRD GENUS. PICEA—THE TRUE SPRUCES.

Stately and valuable lumber and ornamental trees of mountainous and northern regions; branches very rough, caused by the prominent pulvina; seeds without resin-vesicles. Sixteen known species, five in Northwest America, in two groups:—

GROUP I. NORTHCOAST SPRUCES.

Two easily distinguished species:—

1. **Tide-land Spruce** (*Picea Sitchensis*, Trautv and Mayer).—Large pyramidal trees, attaining 150 to 200 feet in height, with a diameter of eight to twelve feet in its headquarters along the fog-drenched Lower Columbia, extending, with smaller trees, northward to Alaska, southward to

Mendocino. Bark thin and flaky; branchlets thick, rigid; cones cylindrical or narrowly elliptical, one and one-half to two and one-half inches long, yellowish; scales elliptical, notched at apex; bract large, lanceolate, six centimeters long; leaves flat, scattered, pungent, young ones whitened above with lines of stomata; the pulvina two centimeters high.

2. **Weeping Spruce** (*P. Breweriana*, Watson).—Beautiful trees of small size, and extremely local; recently discovered on the west end of the Siskiyou Mountains, about twenty miles from the ocean; a few trees on nearby mountains, north and south. Readily distinguished by its long, slender, drooping branchlets, six to eight feet long, and its peculiar cones, narrowly elliptical, two to three inches long, narrowed with many empty scales to each end.

GROUP II. INTERIOR AND SOUTHERN SPRUCES.

Three species, difficult to distinguish:—

3. **Columbian Spruce** (*P. Columbiana*, Lemmon). *N. Sp.*—Medium sized trees of the Columbian region, with headquarters on the Cascade Range of Washington, where it attains a height of seventy-five to one hundred feet, with a diameter of three to five feet, extending, with smaller forms, southward to Oregon, eastward to Idaho and Montana, northward to British Columbia, with dwarfed specimens in Alaska. Bark light-colored, thin, hard, and flaky; branches short, especially those on the upper half of the tree; branchlets slender, two to three millimeters thick; cones small, narrowly elliptical, one and one-half to two and one-half inches long, yellowish; scales obovate, thin, edges wrinkled, scale bracts small, acute, three to four millimeters long. Recently separated* from Engelmann's Spruce, a much larger tree with many different characters, inhabiting a more southern region.

* *Garden and Forest*, May 12, 1897.

4. **Engelmann's Spruce** (*P. Engelmanni*, Parry.).—Becoming large trees, 100 to 150 feet high, and four to six in diameter, in its headquarters on the Rocky Mountains of Colorado, at elevations of 5000 to 12,000 feet, ranging northward, in smaller forms, to Wyoming, southward to New Mexico and Arizona, and westward to Utah. Spindle-form trees (the upper limbs larger than the preceding), with thick, brown bark, deeply furrowed; branchlets more robust than preceding; cones brownish, larger, elliptical, two to three inches long; scales rhomboid, thicker and firmer; bracts larger and truncate or spatulate.

5. **Blue Spruce** (*P. pungens*, Engelm.).—Small trees, along streams or in wet places, rare and local in a few localities of Wyoming, Colorado, and Utah, at lower altitudes than the preceding, and never forming exclusive forests. Foliage strikingly light green or bluish; the leaves rigid and pungent—characters that usually distinguish the species.

FOURTH GENUS. TSUGA—HEMLOCK SPRUCES.

Branchlets roughened by pulvina, but not so markedly as in the true spruces; cones terminal, small; leaves petioled or stalked, each with a single resin duct along the back; seeds with resin vesicles on upper surface. Male flowers in globular clusters, terminal or scattered, raised at maturity out of the bud by a half-inch stipe. Six known species; two in our North Pacific region (or one only if *Hesperopeuce* is maintained):—

1. **Western Hemlock** (*Ts. Mctensiana*, Carr.).—Picturesque pyramidal, often very large trees; headquarters in the great fog-nurtured forest along Puget Sound, where it attains a diameter of eight to twelve feet, extending through British Columbia to Alaska, southward through Washington and Oregon to Northern California. Distin-

guished by its light-green foliage of short, flat leaves, in two ranks, bordering pinnate branches forming broad horizontal or declined sprays, the little ovate half-inch cones, like tassel buttons, fringing the whole. This species very similar to the hemlock of the Eastern States and Canada, and the two Chinese species, but widely different from the next.

2. **Alpine Hemlock** (*Ts. Pattoniana*, Engelm.). (*Hesperoepuce Pattoniana*. Lemmon).—Often very large, six to ten feet in diameter, always exceedingly graceful trees, in scattered groves of alpine or sub-alpine forests in the Sierra, Cascade, and Northern Rocky Mountains. Detected at sight, by their dark-green foliage, the spire-like outline, the slender sprays of foliage, each branch tapering to a slender shoot that sways with every breeze. Cones largest of the genus, narrowly elliptical, one and one-half to three inches long, purple until ripe, then light brown; the scales usually reflexed; leaves quadrangular, usually somewhat tufted, resin duct very large; pollen grains bilobed.

This lovely Alpine Spruce has so many aberrant and peculiar characters that the writer published it once as the type of a distinct genus.*

A variety (*Hookeriana*, Lemmon) of smaller trees with shorter upper branches—rendering the tree sharply pin-nacled—cones one and one-half inches long; scales not reflexed at maturity; extends from the Northern Cascades and Northern Rockies through British Columbia to Alaska.

SECTION 2. EXSERTÆ — FEATHER-CONE SPRUCES.

Cones subterminal, the scales strongly convex, bracts membranous, one fourth of an inch or more wide, greatly developed and long exserted, about an inch long, trilobed, the middle one being the extension of the strong awl-shaped midrib, the side ones cuneate, acute; buds of both kinds

* *Hesperoepuce Pattoniana*, Third Report, State Board Forestry, 1890.



Engelmann's Spruce
Picea Engelmanni

ALPINE HEMLOCK—*Tsuga Pattoniana*.

ENGELMANN'S SPRUCE—*Picea Engelmanni*.

From photographs by John G. Lemmon.



very large; one-fourth to one-half inch long, of few large brown scales; leaves petioled, flat, on young trees in two ranks, mostly scattered, not standing on pegs, nor promptly deciduous. One genus, peculiar to our western region:—

FIFTH GENUS. PSEUDOTSUGA.—FALSE HEMLOCK
SPRUCES.

Comprising the largest and most valuable spruce trees in the world. Cones ovate or elliptical, light brown or darker; leaves one to two inches long, whitened beneath with stomata, and each with two longitudinal resin ducts. Two species:—

1. **Douglas Spruce** (*Ps. taxifolia*, Britton.)—Large, strong-timbered trees of wide distribution, but limited to our Pacific region, forming the greater part of the dense forests around Puget Sound, where it attains the enormous diameter of twelve to fifteen feet, with a height of 300 to 450 feet. It extends, with less dimensions, northward to Alaska, eastward to the Rocky Mountains, southward on both coast and interior ranges, with many wide gaps, far into Mexico. Bark very thick on large trees, and deeply fissured, black or reddish. Lower branches often sending out long, slender, drooping, branchlets, six to eight feet long; this form especially common in the high, moist regions around Yosemite, and northward to Shasta. Cones two and one-half to three and one-half inches long, light brown, beautifully decorated with the three-parted, feather-like bracts, by which it may always be readily distinguished. Very strong and serviceable timber, variously designated by lumbermen as Red Fir, Yellow Fir, and Oregon Pine.

A small form of this tree, with spongy, corky bark, small cones, one and one-half inches long, and short, scant leaves, is found on the peaks of Northern Arizona, at elevations of 9000 to 10,000 feet. This form was recently published as a marked variety—the Cork-bark Spruce.*

* *Ps. taxifolia*, var. *suberosa*, Lemmon. Erythea, vol. 1-48, 1893.

2. **Big-cone Spruce** (*Ps. macrocarpa*, Lemmon).—Smaller, less symmetrical trees, larger limbed, and with darker and much larger cones—largest of the spruces—five to seven inches long, half as wide when opened; the scales firmer and thicker; bracts firmer; seeds very large, with half-inch wings. A local species limited to the San Bernardino and neighboring mountains; particularly distinguished by its magnificent and beautifully feathered cones. First separated from preceding and published by the writer in 1879,* and repeated frequently before its appearance in the Forestry Report of 1890.†

CLASS B. ERECTES.—UPRIGHT-FRUITED SOLITARES.

THE FIRS.

Mostly becoming large trees; branches arising annually in symmetrical horizontal whorls or circles of three to nine, pinnate again and again, forming fan-like strata of dense foliage; leaves short, mostly in two ranks; cones maturing in one season, either erect (or arrect, becoming erect in the Chinese fir); scales and bracts deciduous, leaving the cone axis standing on the limb. Two genera: one (*Keteleeria*) peculiar to China, the other widely distributed and particularly abundant on the Pacific Slope.

SIXTH GENUS. ABIES—THE TRUE FIRS.

Cones cylindrical, or nearly so, and oblong, of many compact scales, erect upon the uppermost limbs, taking the place of branchlets (very plain illustrations of the fact that all cones are but condensed and much modified branches). The bracts are membraneous, and at first much larger than the scales, in some species remaining undeveloped, in others greatly enlarged and long-exserted; scales numerous, wide above and slightly convex in the exposed part, but unarmed, deciduous with the persistent bracts at maturity; seeds with

* *Tsuga macrocarpa*, in *Pacific Rural Press*, Feb. 8, 1879.

† *Pseudotsuga macrocarpa*. Third Report, State Board Forestry, p. 134, 1890.

resin vesicles, and three fourths covered by the clasping base of the broad wing. Male flowers oblong, colored, scattered, solitary in the axils of last year's leaves; these mostly twisted at base to bring them into two ranks.

The firs are readily detected, the world over, by their symmetrical layers of branches, diminishing in size from base to apex, and by the prim, erect cones, the scales falling away at maturity. Of the ten western species several are closely connected, therefor, difficult to distinguish. May be divided, for convenience, into three groups:—

GROUP 1. NORTHERN FIRS.

Extending from Alaska southward to Northern California, and along the Rockies to Colorado. Cones of the northern species dark colored; leaves mostly flat. Four species:—

1. **Sub-Alpine Fir** (*Abies lasiocarpa*, Nuttall).—Small spire-shaped alpine and sub-alpine trees of the high peaks in Alaska and British Columbia; southward in larger forms, and in detached groups to Colorado and Oregon. Bark thin, smooth, milk-white outside; cone very small, narrowly elliptical, two to three inches long, purple, with short, tangled hairs. Male flowers red, conspicuous.

2. **Lovely Fir** (*A. amabilis*, Loud.).—Larger, full-crowned trees, in detached groves on mountain slopes, or sub-alpine, from British Columbia southward to Oregon, —especially abundant on the slopes of Mount Hood. Bark gray, one to two inches thick; cones strictly cylindrical, oblong, three to four and one-half inches long, dark purple, shining; scales striated within, cartilaginous (retracting with great force when confined in making botanical specimens); leaves dark green, flat, crowded upon the branchlets. Male flowers crimson, conspicuous, beautifully decorating the borders of the sprays of foliage.

3. **Noble Fir** (*A. nobilis*, Lindley).—Very large trees, six to ten feet in diameter, and 200 to 300 feet in height, on the Cascade Mountains near Mount Hood, southward nearly to California, and on the Coast Range from the Columbia nearly to the Siskiyou Mountains. Bark thicker, brownish; cones brown, very large, nearly cylindrical, five to seven inches long; scales numerous, narrow as compared to others, the brown bract membranous, a half inch wide, very long, protruding one-half to one inch, strongly reflexed, the subulate midrib almost black. Noble trees, distinguished by their limited habitat and peculiar cones. Excellent timber trees, manufactured in Oregon under the name of "Larch."

4. **Oregon White Fir** (*A. grandis*, Lindley).—Large trees of the Northwest, in moist localities, abundant in the region of Puget Sound, mingled with Douglas Spruce, southward to the Mendocino coast. Bark usually thin, finely checked, dingy white or darker; cones dark green, narrowly oblong, two to three inches long; bract undeveloped, hence concealed; leaves mostly in two ranks, one to one-half inches long, dark green, and shining above, conspicuously whitened below, with numerous lines of stomata.

GROUP II. CALIFORNIA FIRS.

Varied trees, some of the largest size, limited to the mountains of California. Cones lighter colored. Four species:—

5. **California White Fir** (*A. Lowiana*, Murr.).—The most abundant of the California firs, extending a little way over the line into Oregon, southward, on both the Sierra and Coast Ranges, to Southern California. Often attains a height of 150 feet, with a diameter of four to six feet. Bark whitish, thick, and fissured; cones light green until maturity, then yellowish, oblong, two and one-half to three and one-half inches long; bracts concealed; leaves quite long, one

to two inches, mostly in two ranks by a twist at base, slightly whitened below. This tree is, by some authorities, referred to *A. grandis*, from which it is separated by habitat, fruit, and foliage. Others refer it to *A. concolor*, as was done in our Forestry Report, and the recently published hand-book,* but it may reasonably be regarded as distinct.

6. **California Red Fir** (*A. magnifica*, Murr.).—Magnificent trees, attaining, in the high Sierra, the largest size of any of the genus, eight to twelve feet in diameter, with a height of 200 to 250 feet, in dense forests trimming themselves to a height of 100 feet or more, thus presenting a shaft of imposing size, supporting the great crown of stratified limbs, surmounted, in the autumn, with circles of matchless cones. Quite local in the middle Sierra, from Plumas to Kern counties, often mingling with the preceding, but usually at higher elevations of 8000 to 10,000 feet. Readily detected by its very thick bark, two to four inches, deeply fissured, brown without, dark red within (detected by cutting or breaking—this character giving the tree the name of Red Fir), and the very large, light purple cylindrical cones, largest of the genus, six to eight inches long and half as thick; bracts usually enclosed, or rarely slightly exposed; leaves quadrangular, not twisted nor in two ranks, those on upper limbs short and close-wrapped, giving the branchlets almost the appearance of nakedness.

7. **Shasta Fir** (*A. Shastensis*, Lemmon). *N. Sp.*—Medium sized trees eighty to one hundred feet high, two to four feet thick, with some characters similar to preceding, but sufficiently distinct. Bark thinner, finer checked than the preceding; cones smaller, darker, inclined to be elliptical, rather than cylindrical; scales more protuberant at apex, the bract broadly cuneate and cuspidate, usually developed to a great size, protruding one-half to one inch from between the

* Third Rep. State Board Forestry, p. 148, 1890, and Hand-book West-American Cone-bearers, 3d ed., 1895.

scales. Forms a dense, almost exclusive forest, on the high lava plateau of Mount Shasta, with a few trees scattered on the volcanic summits of neighboring peaks.

Has been confounded with the preceding—*A. magnifica*—but Dr. Murray founded that species upon very different trees growing “on the high, unexplored part of the Sierra Nevada to the eastward of San Francisco.” Published as a variety of the Magnificent Fir, 1890, and recently raised to the rank of a species.*

Another form—var. *xanthocarpa*, Lemmon, the “Golden Fir,” becoming of large size, with thinner bark than the preceding, finer checked; cones smaller, and dark yellow, with long, lighter colored bracts. Found on the southern slope of Shasta, at about 9000 feet altitude. The golden cones are unique in the genus.

8. **Bristle-cone Fir** (*A. venusta*, Koch).—Small, slender, pinnaced trees, few in number, local upon certain slopes of the higher Santa Lucia Mountains, near the Monterey line. Cones oval or elliptical, two and one-half to three and one-half inches long, with firm scales, the broad bracts barely concealed, but the strong midrib greatly prolonged, one to two inches, and recurved; buds largest of the genus, one-half inch long; leaves large and broad, lanceolate, one to two inches long, much whitened beneath by many lines of stomata, mostly in two ranks, with twisted bases,—all very distinguishing characters of this most beautiful of the firs, which the discoverer, David Douglas, not inaptly, named *venusta*, in honor of the goddess of beauty, Venus; but as all these Northern pitch trees were called pines in his day (1831), subsequent separation of the genus, and founding of new genera, required that his name of *Pinus venusta* must be changed to *Abies venusta*, and Professor Koch was the first to do this—hence, under the

**A. magnifica*, var. *Shastensis*, Lemmon. Third Report State Board Forestry, 1890, and *A. Shastensis* Lemmon, N. Sp., in *Garden and Forest*, May 12, 1897.

rules, the corrected binomial is to be credited to the latter person, as foregoing.

GROUP III. EASTERN AND SOUTHERN FIRS.

Two quite dissimilar species:—

9. **Colorado White Fir** (*A. concolor*, Parry).—An exceedingly white-foliaged tree, attaining a medium size in its headquarters on the mountains of Colorado, thence extending in scattered groves, southward to New Mexico and Arizona, westward through Utah, sparsely to Southern California. Bark gray, thick; leaves flat, very large, one and one-half to two inches long, whitened with lines of stomata on both sides (whence the name *concolor*), young shoots, also, hoary-whitened, the large circular leaf scars, slightly elevated, forming shallow cups; cones small, two to three inches long, pale yellow. This beautiful fir, whitened in so many of its parts, is readily detected.

10. **Arizona Fir** (*A. Arizona*, Merriam). *N. Sp.*—A beautiful little fir, local on the San Francisco Mountains of Northern Arizona, between the altitudes of 8900 and 9500 feet, and at similar altitudes on a few neighboring peaks. Trees about sixty feet high by one foot in diameter; bark “a highly elastic, fine-grained cork, usually creamy white, with irregularly sinuous ridges”; leaves of lower branches nearly flat, three-fourths inch long, of the upper, triangular and shorter, one-half inch long; cones dark purple, very small, two inches long, three-fourths thick, the scales much broader than long; bracts and seed-wings also broader than long.

Discovered and described by Dr. C. Hart Merriam.*

Excepting the peculiarities of the bark, the characters of this fir are not far removed from *A. lasiocarpa*, to which Professor Sargent thinks it belongs, in which case it may be designated as *Abies lasiocarpa*, variety *Arizona*, the Cork-barked Fir.

* Proc. Biol. Soc., Washington, Vol. X., Nov. 3, 1896.

TRIBE TWO. ARAUCARIEÆ—SOUTHERN PITCH TREES.

(Inserted here to complete the classification.)

Less resinous, mostly lofty trees, with branches in symmetrical whorls, one whorl or circle to each season; flowers diœcious (*i. e.* male on one tree, female on another), or monœcious (on same tree); cones globular; scales numerous, spirally arranged, consolidated with the smaller bract; seeds, one to six to each scale.

Beautiful trees of the Southern Hemisphere, one genus of which, *Araucaria*, is frequently found in cultivation, and just coming into bearing in California. Flowers diœcious; cone-scales deciduous, large, and mostly armed with strong spines, each scale bearing one large seed, firmly imbedded between the scale and consolidated bract. Chief of the species cultivated are, *Ar. excelsa*, "Norfolk Island Pine," with magnificent, ample, horizontal sprays of dense foliage, consisting of awl-shaped, soft leaves, scattered all around the numerous, slender, pinnate branchlets; the *Ar. Bidwillii*, "Bidwill's *Araucaria*," with strong, cartilaginous, ovate-lanceolate, spine-tipped leaves, one and one-half to two inches long; cones very large, ovate, eight to twelve inches long, with heavily-armed scales, and seeds one and one-half inch long, and half as thick; and *Ar. imbricata*, "Monkey Puzzle," large trees of the Andes of Chili, with the formidable leaves long, persistent, and imbricated or lapped closely around the long, drooping limbs and the trunk—defying the attempts of monkeys to climb the trees—hence the very large, delicious nuts, are preserved for use, by the natives.

TRIBE THREE. TAXODIÆÆ—THE TAXODIADS.

Cypress-like trees of both Hemispheres, less resinous than the two preceding tribes, but the arrangement of organs spiral like them. Includes trees of the largest size,

abundant in past ages, a few only now extant. Leaves small, scale-like or rarely linear; cones requiring one to two seasons to mature, are small, globular or oblong, mostly woody; bracts partially consolidated with the scale or obliterated; seeds, two to nine to each scale. Two classes:—

CLASS A. DENUDÆ — BALD TAXODIADS. SWAMP
CYPRESSES OR CEDARS.

(Inserted to complete classification.)

Trees with small, tender, deciduous leaves; cones embossed or reticulated; scales peltate or club-shaped. Two genera, neither with representatives native to our region, but often found in cultivation. *Glyptostrobus*, the Embossed Cedar, an only species, with minute deciduous leaves; cones about the size of a hen's egg, the spirals of scales largest in the middle of the cone, the dark, separating lines give it the appearance of being in a net or reticule. A native of swampy ground, in China, where it is called by a name meaning Water Pine. *Taxodium*, Bald Cypress (largely present in early ages), is now represented by one species in the Southern States and a second in Mexico. Branchlets slender, and elegantly pinnated with delicate leaves, in two ranks, deciduous; cones broadly ovate, one to one and one-half inches long, hard, with an uneven surface. The Bald Cypress of the Southern swamps is particularly noted for its "knees"—conical, tumor-like bodies, arising from its roots, to a height of two to three feet, covered with a smooth, red bark, like that of young trees, and hollow. The part these curious excrescences play in the economy of the parent is unknown.

CLASS B. SEMPERVIRENTES — EVERGREEN TAX-
ODIADS. BIG TREES AND THEIR ALLIES.

Trees retaining their leaves during several years. Four genera: *Sequoia*, *Cryptomeria*, and *Sciadopitys* — the two last-named Southern and Oriental trees, often met with in cultivation, hence needing brief descriptions:—

The *Cryptomerias* are beautiful, pyramidal trees, often of great size, like those planted hundreds of years ago, around the temples of Japan. They resemble our big *Sequoias*, but may be at once detected by their early bearing habit, trees being filled with fruit at a foot or two in height; cones globular, about a half inch in diameter, the scales palmately divided at the edge, so that the open, ripe cone is somewhat prickly. The *Sciadopitys*, a solitary species from Japan, is distinguished by its verticillate or umbrella-like rays of "cladoles," these being modified branchlets, performing the office of leaves. two to four inches long.

Chief of the Evergreen Taxodiads is the chief of all trees in size—the great Redwoods belonging to the remarkable Western:—

SEVENTH GENUS. SEQUOIA—REDWOODS, OR BIG TREES.

Largest and noblest trees known, peculiarly confined to the limits of California. Cones oval; seeds like those of a parsnep; scales arranged in three coils, each an obpyramidal or cuneate section, the point inwards, entering the cone axis, the apophysis, or exposed part, rhomboid, slightly embossed, with a depressed, transverse line, and a central seta or bristle (when young), about a fourth inch long, the scales, when maturing, shrinking a little to discharge the numerous seeds, but not changing position; seeds four to nine to each scale. Male flowers, yellow, about one half inch long, axillary upon young shoots—these, as well as those of the cones, clothed with short scales.

The character and value of the wood are too well known to need further mention. About a score of species are known by their vestiges to have dominated the forests in past ages. Two surviving species:—

1. **Coast Redwood** (*Sequoia sempervirens*, Decaine).—Famous lumber trees of the coast, growing in ravines and wet places, in numerous groves, from near the southern



LOVELY RED FIR—*Abies-jambuths*.

From photographs by John G. Lemmon.



GIANT SEQUOIA—*Sequoiadendron*.



boundary of Monterey County, northward, with larger, compact bodies, to Mendocino and Humboldt Counties—a few small saplings being found just over the line in Oregon. Cones small, oblong, or oval, one-half to three-fourths inch long; scales about twenty; seeds about fifty; leaves bright green, flat, one-half to one inch long, mostly in two ranks, those on the main stems and peduncles, and usually the lower ones on the spreading branchlets, short, scale-like, and oppressed. This, the renowned Coast Redwood, is the most valuable tree of the California forests, often attaining eight to twelve or rarely fifteen feet in diameter, with an unexcelled height of 300 to 400 feet, the limbless trunk, eighty to one hundred feet; bark soft, porous, very thick, six to twelve inches, deeply fissured longitudinally.

Trees remarkable for tenacity of life, roots and stumps readily sprouting, adventitious buds arising, even from the heart-wood of burned stubs. Forest being removed by lumbermen with most efficient and expeditious machinery. Probably not a single unprotected tree will be left standing fifty years hence.

2. *Sierra Big Tree* (*S. Washingtoniana*, Sudworth).—Gigantic trees with straight, comparatively smooth, columnar trunks, 300 to nearly 400 feet high, and twenty to thirty, even forty feet in diameter. Strictly limited to the western slope of the Southern Sierra, in half a hundred groves, or forming larger forests of 2000 to 5000 acres, beginning with a small, lately discovered grove in Placer County, at an elevation of 5000 feet, extending southward in detached groves, as at Calaveras (the first discovered grove), 4700 feet, Tuolumne 5500 feet, Mariposa 6000 feet, to the numerous groves and larger forests at higher elevations, in Fresno and Tulare Counties.

This colossal Washington tree, unmatched in all the world for the size and uniformity of its stupendous column,

and the thickness of its bark (one to two feet), differs from its only living brother, the Coast Redwood, beside the points named, mainly in having softer, darker colored wood, and softer and thicker bark, larger cones, which are ovate, about the size of a hen's egg, the seeds numerous, 150 to 200 to a cone; leaves small, scale-like, rigid, acute, and scattered; branchlets pendulous; also, this tree is not so tenacious of life, and does not sprout from the stump or roots. Trees of a preceding generation (as shown by their stubs or bits of trunk in almost every grove), seem to have attained the enormous age of 4000 to 5000 years. As all the present generation have the appearance of vigorous youth, with full crowns of limbs, and seldom a hollow trunk, and as they are now most of them protected in reservations, it is probable that many of them will reach or exceed any age yet predicted upon ring-countings of ancestors.*

(To be concluded.)

* For an account of the change of the name of this famous tree from *Sequoia gigantea* to *S. Washingtoniana*, and the reasons therefor, see late article in *Sunday Call*, San Francisco, June 13, 1897, and republications (with corrections and additions) in *Oakland Enquirer*, June 16, 1897, and *Pacific Coast Wood and Iron* San Francisco, November, 1897.

CONSPECTUS OF THE SPRUCES, FIRS, AND SEQUOIAS.

SUBTRIBE B—SOLITARIÆ (OF THE TRIBE ABETINÆÆ). Evergreen, with solitary, short, linear leaves; cone-scales, leaves, etc., in spirals. THE SPRUCES AND FIRS.	<div> <div>CLASS I. PENDENTES— PENDENT-CONE SOLITARES. The Spruces.</div> <div> <div>INCLUSÆ. Cones naked.</div> <div> <div>PICEA—True Spruces.</div> <div> <div>Species.</div> <div> <div>Interior Species.</div> <div> <div>3. <i>Columbiana</i>.....Columbian Spruce.</div> <div>4. <i>Engelmanni</i>.....Engelmann Spruce.</div> <div>5. <i>Pungens</i>..... Blue Spruce.</div> </div> </div> </div> <div> <div>TSUGA, The Hemlock Spruces.</div> <div> <div>1. <i>Mertensiana</i> Western Hemlock.</div> <div>2. <i>Pattoniana</i>Alpine Hemlock.</div> </div> </div> </div> </div> <div> <div>EXSERTÆ. Cones feathered</div> <div> <div>PSEUDOTSUGA, False Spruce.</div> <div> <div>1. <i>Taxifolia</i> Douglas Spruce.</div> <div>2. <i>Macrocarpa</i>.. Big-cone Spruce.</div> </div> </div> </div> </div>	<div> <div>CLASS II. ERECTES—ERECT- CONE SOLITARES. The Firs.</div> <div> <div>FALSE FIR. Scales tardy.</div> <div> <div>KETELEERIA, Chinese Fir.</div> </div> </div> </div>	<div> <div>TRUE FIR. Cone scales deciduous.</div> <div> <div>ABIES—True Firs.</div> <div> <div>Northern Firs.</div> <div> <div>1. <i>Lasiocarpa</i>. ... Sub-Alpine Fir.</div> <div>2. <i>Amabilis</i>. ... Lovely Fir.</div> <div>3. <i>Nobilis</i>..... Noble Fir.</div> <div>4. <i>Grandis</i>.....Grand Fir.</div> </div> </div> </div> </div> <div> <div>California Firs.</div> <div> <div>5. <i>Lowiana</i> California White Fir.</div> <div>6. <i>Magnifica</i> California Red Fir.</div> <div>7. <i>Shastensis</i>Shasta Fir.</div> <div>8. <i>Venusta</i>.....Eristle-cone Fir.</div> </div> </div>
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Southern Firs.

9. *Concolor*.....Colorado White Fir.

10. *Arizona*. Arizona Fir.

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A WOMAN'S TRIP THROUGH THE TUOLUMNE CAÑON.

BY JENNIE ELLSWORTH PRICE.

It was late in July when our party of four, Mr. W. F. Reid, Mr. Theodore Solomons, Mr. Price, and myself, gazed from the top of El Capitan into the Yosemite Valley. We had left roads and stages, footprints and dust, behind at Gin Flat, whither we had journeyed by foot from Hodgdon's, and had followed across country, through forests and meadows, into cañons, over ridges, until we had reached the well-known paths of the tourist. After a few days in the valley, we left for the High Sierra, the Cathedral Peak trail guiding us in the direction of the Tuolumne Meadows, until Cloud's Rest was passed, where, leaving all marks of civilization behind, we made our way up the Merced River to the top of Merced Peak. Then back again, through beautiful green fields and dense pine forests, to the Merced-San Joaquin divide, and on to the summit of Ritter. But it was not until we had passed over McClure's trail into the Tuolumne Meadows, and had camped at Lake Tenaya, that we began in earnest preparations for our descent of the Tuolumne Cañon.

For many months the thought of ascending Ritter and descending this Grand Cañon had been uppermost in our minds when discussing our proposed trip, and now that four weeks of delightful experience had given us strength and courage, and having accomplished one of the desired feats, nothing could dampen our enthusiasm toward making the second a reality. So we spent the whole of the morn-

ing of the tenth of August in dividing camp provisions and packing knapsacks, for, after nearly a month of pleasant companionship, our party practically disbanded at Lake Tenaya.

Mr. Price, Mr. Solomons, and myself took the old Virginia Creek trail, which leaves the lake just back of the cabins, and started boldly on our journey. For a mile or more the way was plainly marked, but, as we advanced, only an occasional "T," the distinctive government blaze, would greet our searching eyes, and finally all traces of recent travel disappeared. At times we could distinguish blazes of years ago on the fallen trunks of dead trees, or, grown obscure, on the sides of living pines, and again even these marks disappeared, and maps were our only means of guidance. Toward the close of the afternoon we passed McGee Lake, reached the White Cascades, and, climbing to an elevation on the left of the river, gazed into the Tuolumne Cañon with greatest interest and expectancy. The scene was enchanting! The Tuolumne River, after dashing itself into foaming rapids, rushed on down the cañon in silvery masses until it spread itself out like shining ribbon amid the green foliage of the forest pines. The walls of the cañon rose ruggedly grand on either side, becoming higher and higher, closing nearer and nearer, and blending in the dim western horizon. Inspiring as was the picture, we could not linger long. So with considerable difficulty, we made our way, with our animal, down the slope along the White Cascades, and in a short time, were enjoying for a last time, until Hetch-Hetchy was reached, the warmth and comfort of our sleeping bags and blankets.

Break of day found us up making final preparations. Mr. Solomons had decided to accompany us on a photographing tour as far as Return Creek. So, after carefully staking our mule in the midst of a grassy marsh, we slung

our knapsacks and began our journey. We were all well laden, for a camera and outfit burdened one back, Mr. Price carried twenty-five pounds, five days' provisions for our party of two, his sweater, and a revolver, and I followed with a knapsack containing the cooking utensils, my jersey, and a few other articles. Its nine pounds I found as much as I could manage. In fact, at first it seemed more than I was equal to, for it took some time to get the proper bend to the back and learn to descend a rock without going head foremost, or rather, pack foremost. But experience is quickly gained in the Tuolumne Cañon, and it was not long before our loads seemed a part of ourselves.

Having camped on the southern bank of the river, we decided to descend for some distance on that side instead of taking the northern bank, along which previous trampers had made their way. But before we had traveled far, we regretted we had not crossed the river at the start, for the rocky slopes, over which we were obliged to walk, grew both steep and smooth, and we could hardly find a safe foothold, while the brush became almost impenetrable, and we made discouragingly slow progress. But we were fully compensated for the delay, for walls had now appeared on either side of the river, whose masses of granite claimed our full attention. With the "Three Brothers" on our left, "Tuolumne El Capitan" and an adjoining bluff on our right, we felt the grandeur of the cañon had not been exaggerated. The tremendous height of the wall-like face fronting on the river with almost perpendicular cliffs, and its color, vertically striped in darker and lighter yellow-grays, glistening in the morning sun, made a wonderfully striking picture. The beauty of the water enhanced the charm of the landscape; for, although only a few moments before dashing itself in wildest confusion over granite walls, it had calmed now into a silvery expanse, glistening here in

rippling diamonds, and there reflecting the glories of the overhanging cliffs.

On we went, over the glaciated surfaces of the rocks, often climbing up for several hundred feet in narrow cracks, or sliding down a distance as great, to advance only a few yards; then, scrambling over high talus and around boulders huge as houses, and forcing a way through sharp, dense thickets—such was our course for several hours, along the mountain river, growing more beautiful in its series of small falls and cascades. Finally, about noon, we approached a point in the river where the water, as if having accumulated energy for a glorious climactic surprise, suddenly dashed over immense granite stairways in a wonderful succession of foaming cascades. The tremendous force of the water, the fearful roar, the tearing, dashing, whirling mass, beaten into snowy foam as it rushed down the granite inclines, were far more grand and inspiring in reality than any photograph could picture to the imagination. We lunched below the Le Conte Cascade, in full view of its foaming, whirling torrents, and were loath to leave the scene. A short walk brought us to the Upper California Cascade, the most beautiful and majestic of the whole series. We had great difficulty in finding a way down the glaciated surfaces of the rocks to a position near enough to see the full extent of the water. Seated finally on a buttress near the foot of the cascade, with the mist falling over us, we gazed with wonder and delight on the exulting, on-rushing mass of snowy torrent, spreading itself over waves of granite, while leaping high in the air with glorious whirls, or shifting from side to side, tossing, tumbling, roaring, with all the exuberance and sprightliness of young mountain energy. Most graceful, most picturesque, this cascade was for me the crowning glory of the Tuolumne Cañon.

Leaving our place on the edge of the buttress, against

which the whole force of the water dashes, and then, unable to advance, turns abruptly to the right, we began to descend the gentle granite slope to the left of the river. We advanced rapidly, for the face of the rock was rough, and there was no danger of slipping. Suddenly, when about half way down, we found ourselves on a glaciated surface, unable to advance or retreat one step without losing foothold and sliding upon the sharp rocks below. After many efforts, Mr. Price finally succeeded in swinging himself into a position where he had one good foothold, but I, too short of limb to follow his example, with no notch in which to place finger or edge of shoe, simply waited, with the palms of my hands tightly pressed against the rock, wondering how long I could keep myself from the fatal plunge. Just at that moment, Mr. Solomons, returning from a distance, and seeing our predicament, hastened to my rescue with a long pole, and just as I was beginning to slide, placed it beneath my slipping foot, and gave me hold firm enough to risk one step in the direction of Mr. Price, and grasp his outstretched hand.

At half past four in the afternoon, when we had reached the confluence of Return Creek and the Tuolumne, we decided to make a crossing to the north side of the river, and wandered up and down the bank looking for a shallow place to ford. The river was, however, very swift at this point, its rocky bed slippery and uneven, and we felt it would not be safe to venture with our knapsacks on our backs, for their weight might at any moment overbalance us, and not only damage provisions, but in all probability wash bag and all down stream. We finally decided to attempt a crossing over a narrow channel, where the water dashed between the walls with a rush that was terrific, and a roar nearly deafening. Near the center of the stream, dividing the channel into two parts, stood a huge boulder, and to this rock we managed, after many attempts, to throw a small tree to serve as a footbridge. Had the farther end

of the tree rested upon a rough, flat surface, we would have experienced no difficulty, but the face of the rock was not only inclined, but smoothly polished by the water, making the crossing all the more venturesome. But, finally, summoning up our courage, though almost dazed by the rush and roar of the foaming torrent, only a few inches beneath our feet, one after another, we passed over the rounding surface of the log to the boulder beyond. Then, crouching on the slippery rock, we succeeded in drawing our foot-bridge after us, and again made use of it in reaching the opposite shore. Landed in safety on the northern bank, we bade farewell to our fellow-traveler, Mr. Solomons, and left him to make his way with his photographing outfit up the cliffs to the north of Return Creek, while we continued our tramp down the cañon.

After an hour or more of rough scrambling through brush and over talus, we willingly confessed we had had enough experience for one day, and were ready to stop at the first comfortable camping place. Here a mild discussion arose between the two members of our party as to what constituted a good sleeping spot, when we must rest for the night with neither blankets nor down sleeping bags for a covering. Mr. Price declared himself in favor of a bed of leaves, with a great fire on either side, and I advocated the advantages of a sand bank, where the flame could not reach us unknowingly. But nature did not seem to heed my decision, for we traveled on and on, and found no sleeping place such as I desired. Finally an inviting spot under the trees near the river was selected, and tossing off our knapsacks with great satisfaction, we were soon enjoying a supper of corn-meal mush, dried apricots, and beef bouillon. After finishing our meal, I left Mr. Price to gather wood while I repaired to the river to wash our few cooking utensils. It was not long before I saw my husband in great distress, gesticulating wildly, and rushing

toward the stream in strangest fashion, motioning me to leave the spot where I stood spellbound. For a moment I could not think at all; then a confusion of emotions passed through my mind, and finally I thought of snakes. The stories of rattlers and their abundance in the cañon had not been a pleasant prospect from the beginning; and now, on our first night, we had been attacked, and Mr. Price probably bitten. In great anxiety I awaited his approach, and, finally, above the roar of the water, I made out that the cause of all my fears, and Mr. Price's gesticulations, was nothing more dangerous than wasps. Sleep, we knew, in the vicinity of a disturbed wasps' nest, with a fire to keep the insects stirring, was next to impossible; so, quickly gathering our belongings, in the darkness we made our way along the stream in quest of a new sleeping ground. It was no pleasure at that late hour to drag our weary limbs over jagged rocks that often tripped our careless feet, or to slip every now and then, in spite of ourselves, into little pools of cold water; but fortunately, we had not far to travel, and this time it was a sand bank we found. An ideal spot it was, sheltered on three sides by huge boulders that acted as reflectors for the heat of the fire, and having ready, within reach, wood of all shapes and sizes, tossed there by spring torrents. Sleeping without blankets was a novel experience, but not as uncomfortable as would be expected. With leggings for a pillow, we managed to sleep the greater part of the night, rousing ourselves at long intervals to replenish our fire.

Morning found us somewhat stiff and sleepy, but, withal, refreshed, and ready for another day's experience. During the early hours, our tramp was a pleasant variety of open flats, rough climbing over talus, and hard scrambling through small clumps of trees.

We were now in that portion of the cañon where the walls began to rise higher and grow more perpendicular,

until, in the distance, the double-peaked Tuolumne Castle seemed to pierce the very skies. We found ourselves gazing about us with ever-increasing wonder and awe, while a feeling of our own helplessness and insignificance took possession of us. Just before noon, from the terrific rush and roar of the water, we knew we were approaching the Muir Gorge, where the angry river, after rising and falling for miles, transforms itself into a hissing, seething mass of churning water. Fascinated, we stood on a great bowlder and watched the frothing water hurl madly past into a veritable prison of granite. Out of this chasm rose, side by side, two bare gray walls to the height of a thousand feet, where the northern wall suddenly turned and swept back to the side of the cañon, forming a great rocky spur. Over this rough point we began our scramble about two in the afternoon. On reaching the summit, we found the Sierra Club register can buried under a substantial monument, and to the records added our names, the first since '94. We camped soon after reaching the river again, and slept the sleep that only the tired mountaineer can enjoy.

The third day was our hardest, for the forest fires, which were raging in the adjoining sections of country, made the air close and sultry. Our ambition seemed to vanish, and we advanced only because it was a necessity, and with the perspiration fairly dripping from our faces. Fortunately, however, we had reached Pait Valley, and had delightful walking all morning over small garden-like openings and level flats, through groves of trees and bushes heavily laden with ripe thimble berries. About half past ten two large deer, startled by our footsteps, went bounding over the floor of the cañon, crashing through bushes and groves of young trees in wildest haste and confusion. For hours we wandered over bears' trails, as well trodden as the ordinary tourist path, and often walked into the feeding grounds of the bear among the manzanitas. For

miles their tracks were visible on the sandy soil, and frequently we were led, in following the trail, to the resting-places of these animals, under the cover of low, sheltering trees.

In the meantime the walls of the cañon, as we had been advancing, had grown less and less perpendicular, farther and farther apart, lower and lower, until, in the distance toward Hetch-Hetchy, though the cliffs were still rugged and picturesque, much of their solemn grandeur disappeared.

In the afternoon, after leaving Pait Valley, we met with rough work once more, and had several hours of difficult scrambling over talus that seemed almost impossible to climb around or over, through brush that pierced our clothing, and over rounded, polished stones by the water-side. The heat was most oppressive, and by five o'clock we were worn out and ready to camp. Just then a sight met our eyes that will long remain in memory. We were on the talus, piled several hundred feet high, and silently struggling along, when, suddenly to our right, and only a few feet away, there fairly shot into the air from out the shelter of huge blocks of granite, two large snakes. They seemed to stand on their very rattles, while, with heads erect, all unmindful of our observations, they twisted their long bodies around about each other, and sported in the most playful manner. The sight was uncanny, yet we stood fascinated for some moments. A second later a shower of missiles made known our presence, and in an instant, rattling loudly as they went, the two reptiles disappeared in the rocks below. A short walk brought us to the river once more, and to a comfortable camping place; but no sooner had our knapsacks reached the ground, than from our very feet came the penetrating, unmistakable rattle again, and two more reptiles were before us. It did not take long to despatch the snakes and secure their rattles, but the place had lost its charm for camping pur-

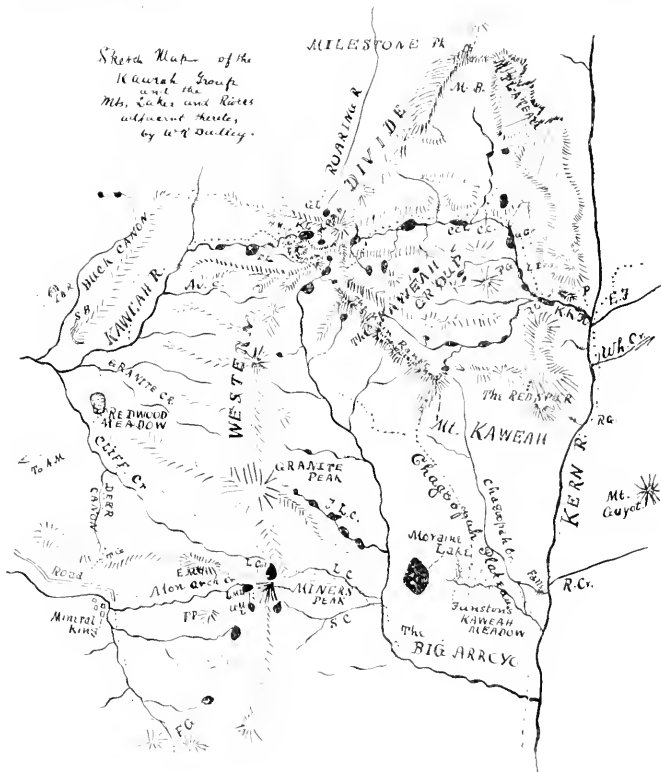
poses, so we slung our knapsacks and started on. More weary than ever, now, we were glad to drop into the first inviting place we came across, and before many minutes had passed, supper was over and we were fast asleep. About twelve o'clock we aroused ourselves to set fire to the great pile of wood which had been collected during the evening, for up to that time the atmosphere, warmed by the burning forests, had made other heat unnecessary. As the first dry twig cheerily crackled in the silence of midnight, from the rocks beyond the fire, and only a few yards away, came once again the same warning note of the rattler. Another snake had been disturbed. But, feeling that all efforts, at that time of night, to escape our unpleasant neighbors were useless, we calmed ourselves as best we could, and in a short time had forgotten our fears in quiet sleep.

We were off on the morning of the fourth day at half-past five, and by seven were delightedly gazing on one of the most beautiful and varied water scenes in the whole cañon. The river, after dashing in small, picturesque whirls for a hundred feet or more, suddenly fell over a perpendicular wall, then dashed on over a silvery apron, smooth and regularly inclined, and then threw itself, with tremendous force, down a great stone stairway in foaming, whirling, tumbling cascades. An hour later, we could see dimly, but unmistakably outlined, far into Hetch-Hetchy, the massive Sugar Loaf; but, before reaching the valley itself, we had to cross one of the roughest spurs that we had met during the whole journey. It was a veritable hauling ourselves up for long distances, then crawling with greatest precision around slippery ledges, only to let ourselves down the rocky cliffs as best we might, jumping, sliding, or slowly edging away; but by ten o'clock we had camped for the day at the entrance to Hetch-Hetchy.

Our journey was over; regret and gladness mingled—

gladness, that an end had come to constant labor; regret, that so much of grandeur and magnificence was far behind us in the cañon. A feeling, almost of indignation, rose within us, when we thought of the glorious cascades, the sheer granite walls, the great Muir Gorge, all pent up within a narrow mountain cleft, inaccessible to the great majority. But anyone who is anything of a mountaineer can see this region, and should journey through the entire length of the cañon, for it is a scenic wonderland, with never a dull step in the whole distance.

[*Editor Sierra Bulletin:*—The Sierra Club is developing some capital mountaineers, and Mrs. Price must be one of the best. The Tuolumne Cañon is perhaps the roughest of all the Sierra streets, and her quiet walk through it was a fine, notable performance. As far as I know, she is the only woman who has traced it through its entire length. The Club should make some sort of a trail through this magnificent cañon. Simply cutting lanes through the densest of the chaparral tangles would go far to render it accessible. Very truly yours, JOHN MUIR.]



Key to the Sketch-Map of the Kaweah Group of Mountains.

Av. C.—Avalanche Canon.
A. M.—Atwill's Mills, on the Mineral King Road.
C. C.—Cache Camp
C. C. L.—Cache Camp Lake
E. F.—"East Fork" of Kern.
E. Mt.—Empire Mountain.
F. G.—Farwell Gap.
F. L. C.—Five-Lakes Canon.
G. C.—Gallat's Corral and Lake.
G. L.—Glacier Lake.
H. M.—Heather Meadow.
K. K. R.—Kern-Kaweah River.
K. L.—Kaweah Lakes (upper and lower).
L. B. R.—Little Blue Rock.
L. C.—Lost Cañon.
L. R.—The "Lion Rock."
L. Col.—Lake Columbine.
L. M. L.—Lower Monarch Lake.
L. I.—Lake of Islands.
M. B.—Milestone Bowl.
M. Plat.—Milestone Plateau.
P.—Kern-Kaweah Pass.
P. G.—The "Picket Guard" Peak.
P. P.—Plumbago Peak.

R. Cr.—Rock Creek.
R. G.—Redspur Gap.
R. L.—Rockslide Lake.
S. B.—The "Sugar Bowl" Dome.
S. C.—Soda Cañon.
T. L.—Tamarack Lake.
Th. G.—Thunder Gap.
T. G.—Timber Gap.
U. M. L.—Upper Monarch Lake.
Wh. Cr.—Whitney Creek.

POINTS:

1. The Kern River runs nearly on the meridian line.
2. Whitney Creek points nearly toward Mt. Whitney.
3. Mt. Guyot, as viewed from Moraine Lake, lies midway between Mt. Whitney and Sheep Mountain.
4. The Sketch Map is planned two miles to the inch.
5. The dotted lines mark the principal routes followed in 1896 and 1897.

THE KAWEAH GROUP.

BY PROFESSOR WILLIAM R. DUDLEY.

In July, 1896, I made my way across the Sequoia National Park, by the way of Mt. Silliman and the Marble Fork, to Alta Meadow, explored a passage across Buck Cañon (one of the steepest and roughest cañons in the Southern Sierra), and reached Mineral King by way of Redwood Meadow and Timber Gap. None of the hunters or stockmen we met about Mineral King could give us a clear account of any trail to the Kaweah Mountains. Ascending Miner's Peak (locally known at present as "Sawtooth," from its peculiar beak-like form, and usually estimated at about 13,000 feet elevation) eastwardly from Mineral King, we perceived that the Kaweahs extended much further eastward than the maps represent them — most maps, indeed, following the Hoffmann-Whitney map of 1873, place them directly on the Western Divide. Not only were they apparently largely detached, but between them and the Western Divide (on which Miner's Peak is situated) was a deep groove—the cañon of the Big Arroyo, just as between the Kaweahs and the Whitney Divide was a deeper groove, the Grand Cañon of the Kern.

The Kaweah River has always been represented as taking its rise from some portion of the peaks of that name, and was currently believed to do so by the hunters and campers who frequent the region of Mineral King every summer. I determined to trace this river to its source if possible; and James Rice, of Visalia, who had hunted well

up the Middle Kaweah, was able to give us explicit and valuable directions for the first half of the journey. The trail from Redwood Meadow crossed Granite Creek, followed the right bank of the Kaweah for a mile, then crossed and climbed to Wet Meadow (the Last Chance Meadow of the Sierra Club map), thence passed northeastward, through Bear Paw and Quaking Asp Meadows, to the "Lone Pine," where it descended from the high ground to the open glaciated upper valley of the Kaweah. It is noticeable that traveling is comparatively easy in the upper valleys of the Sierra streams. Trouble comes in at the rocky passes between the upper valleys and in the narrow cañons in the lower altitudes. We camped at the upper meadow of the Kaweah, which was named Heather Meadow, from the large amount of *Bryanthus Breweri*, or "Sierra Heather," growing about. It was by nature a beautiful secluded Alpine meadow, but ruined by sheep. Looking down upon the meadow from the east was a noble peak, whose head and projecting arete cliffs had, in the descending sun, all the repose of the front of a couchant lion. It was named the Lion Rock. The Kaweah comes from the north of this peak, and its source was found in one small and one larger lake, fed by small glaciers from its rear, and from the divide of which the peak is a spur. These were named the Kaweah Lakes.

To the north of these lakes was the beginning of the Kings-Kaweah Divide, and over a high foot-pass in this, but close to the Western Divide, we found the source of the Roaring River in a beautiful circular lake fed by a well-formed glacier. It was after the middle of August, but small icebergs were floating in this and the upper Kaweah Lake, broken from the glacier fronts. From this fact and the presence of old snow and blue ice in these steeply sloping but not extensive snow fields, we speak of them as glaciers. Their motion, which must be slow, was not

observed. We were overtaken here by a storm of hail, accompanied by thunder and lightning, and named the pass to Roaring River, Thunder Gap. From this point the open upper valley of the river stretches straight away northwardly. Ascending, on another day, to the summit of the Western Divide, by way of the cañon south of the Lion Rock, we saw the head lakes of the Big Arroyo lying in a deep cañon at the foot of the cliffs, east and south of us; and off to the southeast of these lakes were the great black Kaweah peaks, connected with the divide apparently (and in 1897 we learned the truth of this supposition), only by a narrow sharp arete, several miles in length. Daily storms prevented further effective exploration that summer.

Early in July, 1897, accompanied by Messrs. Wight and Dudley, students at Stanford, and by Mr. Dean, of Three Rivers, on the Kaweah, who furnished us with our saddle and pack animals, we made our way over the Salt Creek and Hockett trails—partly over my old collecting grounds of 1895—to the southern side of the Kaweahs, by way of the Kern River Cañon. Taking Funston's sheep-trail, the only break for many miles in the great western wall of the cañon, we ascended to Mr. Funston's cabin at the great meadow on the plateau south of the Kaweahs. This is a rolling plateau, several miles square, 9000 to 10,000 feet elevation, and covered with Tamarack pines and meadows. We have mapped it as the Chagoopah Plateau, as it is traversed by the creek forming the Chagoopah Falls. A week was spent in this vicinity exploring the Big Arroyo and Mt. Kaweah, the ascent of the latter being easily made in one day. I quote from Vol. I., page 382, of the Geological Survey of California, by J. D. Whitney: "This last-named (Kaweah Peak) was not reached by our party, but its height was estimated to be over 14,000 feet. From its great elevation and peculiar position opposite the highest point of the Sierra, and the immense depth of the cañon

of the Kern between it and Mt. Whitney, it would probably command the grandest view which could be obtained in the whole range of the Sierra." This view is, in fact, one of the most instructive, if not the grandest. Stimulated by what it revealed, I resolved to try the exploration of the cañons north of the Kaweahs, which we afterward named the Kern-Kaweah River and the Milestone Bowl. This was accomplished, by way of the Kern River Cañon, after another week's hard riding and climbing. The Kern-Kaweah Pass, out of the Kern, is something that will debar the ordinary explorer from this cañon for some time to come, and should not be attempted, except with such excellent mountain animals as Mr. Dean furnished us. We ascended the main branch of the Kern-Kaweah to its source, which lies on the east side of the sharp ridge (about 12,500 feet elevation) connecting the Western Divide with the Kaweahs. One small brook comes from that peak of the Western Divide at whose western and northwestern bases lie Kaweah Lake and Glacier Lake, sources of the Kaweah River and Roaring River. We looked over this connecting ridge and saw, at its western base, the head lakes of the Big Arroyo, the same I had looked at, in August of 1896, from a point opposite, on the Western Divide.

We next ascended to the Milestone Bowl, and from the plateau at its head (over 13,500 feet, and once a part of Milestone Peak) we had the most complete view of the Kaweahs obtainable, and one of the best general views of the Sierra I have seen. Here it was shown even better than from Mt. Kaweah, that the group consisted of three chains (with a remnant of a fourth), spreading southeast and east from the connecting ridge in a fan-shaped manner, as indicated on the map. From their lofty elevation and east and west trend, there is more snow among them in August than among most of the peaks of the Southern Sierra. The black peaks of the main chain are thin, saw-

like, and very precipitous on both faces. From near Fresno I have seen them in midwinter, through a gap in the Western Divide, peering over, black and ragged, from behind the snow-mantled peaks of the ranges about them. Their faces were too steep for snow to lie on them. The gray Kaweah (Mt. Kaweah) the easternmost peak of the main chain, somewhat more tedious of ascent than Mt. Whitney, but perfectly safe, has been reckoned as about 14,140 feet elevation. From Mt. Kaweah, this chain continues east to near the Kern, in a long, reddish, sloping ridge, seen from many places in the Kern River Cañon. We named it the Red Spur. Where it terminates near the Kern is the grandest scenery of the cañon. There is a fine pyramidal peak at the eastern end of the third range, which was always in the background of the view as we entered and ascended the narrow cleft of the Kern-Kaweah. This was named the Picket Guard.

Finally, descending from the upper Kern-Kaweah to the Kern by the pass through which we had left it, we ascended the middle fork for a mile or two, climbed out of the cañon eastward, and, by the end of the second day from the Kern, we had reached Mt. Whitney, ascended to its summit, and returned to our camp at its base. It was about one full day's journey from the junction of the Kerns to the Upper Crabtree Meadow.

Before our return to the valley, we were enabled to see most of the larger tributaries of the Kern; and apparently the Big Arroyo and the Kern Kaweah separately pour more water into the main stream in midsummer than any of the branches from the east; and the Kern-Kaweah is larger at its junction with the Kern than the Kern itself.

The above is the merest outline of the two efforts at the exploitation of this region, and gives nothing of the splendor of its great peaks, the beauty of its waterfalls, the grand processional of scene in the upper Kern River

Cañon, or the devastation occasioned by sheep-feeding on all the ranges except that of the beautiful Chagoopah Plateau (Funston's) where a more rational practice prevails. On the other ranges the great obstacle to the explorer is not danger from crag or chasm, but the starvation threatening his animals, through the destruction of the fine natural meadow pasturage by sheep.

The accompanying map is expected to give the true relationship of only the principal points about the Kaweah Mountains. It does not include a considerable amount of detail accumulated in notes and sketches, also in photographs which Mr. Wight took largely for my satisfaction.

It has been constructed, however, with considerable care in regard to proportion, the position of lakes, streams, and mountains, and their relation to certain well-known points, such as Mt. Whitney, the Milestone, and Miner's Peak. The dotted lines represent our journeys, and usually correspond to trails (mostly of sheep men), sometimes to routes of our own choosing.

Those who consult the map are asked to observe that it presents the following geographic facts practically new to science:—

1. It shows the almost complete isolation of the Kaweahs from the Western Divide, and their division into three or four chains.
2. These peaks are wholly drained by branches of the Kern River, principally by the Big Arroyo and the Kern-Kaweah, which have never before been mapped recognizably, neither have any explorations of them been published.
3. The Kaweah River drains no part of the Kaweah Mountains.
4. The lakes at the river-sources and elsewhere are new to the maps. A considerable number among the Kaweahs and along the Western Divide are not indicated,

but with the number given suggest the elevated and highly glaciated character of the region.

5. The peaks giving rise to the Kaweah and Roaring Rivers and the two chief branches of the Upper Kern represent one of the principal geographical centers of the Southern Sierra.

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

THE MAZAMAS' TRIP TO MT. RAINIER.

The Mazamas, the mountaineering society of the Pacific Northwest, with headquarters at Portland, pursue the custom of making a concerted expedition to some mountain region in their field during each summer, and invite to join them all others who will go, to climb some snow peak, explore its surroundings, and enjoy its attractions. Their expedition of 1897 was to Mt. Rainier,* Washington, and was the most ambitious they have yet attempted. It brought together, late in July, in Paradise Park, on the south side of Rainier, about two hundred mountain lovers. Of these, about seventy-five were bold enough to wish to climb the mountain, while the rest found abundant fields for enjoyment on the glaciers and among the lesser though difficult peaks of the neighboring Tatoosh Range. To conduct so large a company at once to the summit of a mountain so high, so difficult to climb, and offering so many dangers to the climbers, was more of a problem in mountaineering than the Mazamas had as yet had to face. It was most successfully solved. All those who proposed to climb were formed into a battalion of five companies, under strict military discipline, and all signed a formal pledge to obey orders strictly. On the climb the companies marched in one long line, single file, all starting and halting according to command. Thus the whole company was kept closed up, and laggards were not left behind. The first day's climb was an easy one, to "Camp Muir," at an elevation of about 10,000 feet, about four miles above the snow-line. Camp was made on an exposed ridge of bare rocks. Several decided not to go beyond this point, where the real difficulties and dangers of the ascent begin.

The ascent from Camp Muir to the summit and return was accomplished the next day, July 27th, between five in the morning

* See discussion of the name of this mountain in No. 4, Vol. I, *Sierra Club Bulletin*, by O. B. Van Trump.



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and nine in the evening. There were sixty on the whole expedition who reached the summit, two small parties climbing in advance of the main company. The last 2000 feet of the climb were rendered unusually dangerous by the condition of the snow, which was hard and crusted, as well as very steep. But, with constant vigilance and continued use of the life line, all accidents were escaped. The party reached the summit about 4 P.M., and were able to stay in the crater less than an hour before it was necessary to return, leaving eight of their number to spend the night on the summit and burn red fire in the evening, and to attempt heliographing and kite-flying the following day. The atmosphere was remarkably clear, and the signal lights were seen and answered from Tacoma and several other distant points. The attempts at kite-flying and heliographing, owing to insufficient preparations, were unsuccessful.

One fatality marked the expedition. At about eleven o'clock on the night of the descent, Prof. Edgar McClure, of the University of Oregon, while within an hour of the main camp at snow-line, lost his footing on a steep slope of snow, and was dashed upon a pile of rocks at the bottom as he slid. Death was probably instantaneous. On the next night two others slipped very near the same place, and fell into a small crevasse, but were rescued after some three hours.

Excepting these accidents, which occurred after the dangers of the ascent were all supposed to have been passed, and after the vigilance previously exercised had been relaxed, the ascent was a remarkable record of successful mountaineering. That sixty persons should have gone in one party to the summit of so high and difficult and dangerous a mountain as Rainier, and all have returned practically to the foot of it without even a scratch or a sprain, is very noteworthy; and the highest praise is due to the Captain of the expedition, Mr. Edward S. Curtis, of Seattle, and to the strict discipline which he maintained.

Without the maintenance of military order in climbing, either a much smaller number would have succeeded in reaching the summit, or else there must almost certainly have been serious accidents at some of the places of danger. It is doubtful, however, whether it will be thought desirable again to attempt to make an ascent with so large a company; and it may be that this ascent of the Mazamas will stand for a long time to come as the best record of concerted climbing yet established.

EARL MORSE WILBUR.

A DIRECT ROUTE FROM SUSANVILLE TO FALL RIVER MILLS.

A study of the map of California will reveal two possible direct routes from Reno to Mt. Shasta. These two routes, passing the one through Quincy, the other through Susanville, converge beyond these towns until they meet at Fall River Mills, from which a road leads directly to Mt. Shasta and Sisson.

When planning our trip last summer, we wished to try the route via Quincy, but were warned that there existed no road to the north beyond Prattville in the Big Meadows, unless we went into the Sacramento Valley. We were also informed that the only road from Susanville lead by a circuitous route through the desert, via Eagle Lake and Bieber, a distance of 100 miles. Both of these statements we afterwards found to be incorrect.

At Susanville we were told of a direct route via Pine Creek, which had been traversed by a few, who were enthusiastic over its advantages. But they were unable to give an accurate description.

I was persuaded to take it and to abandon it half a dozen times within as many hours; but, of course, the last man to offer his advice won the day and sent us forth with fair directions for the first half of the journey, but with only these words ringing in our ears to direct us over the remainder of it: "If you lose the road, after leaving Pine Creek, bear to the northwest until you reach Fall River Valley." Before night we found the headquarters of Galen C. McCoy, who had a thorough knowledge of all the northern Sierra uplands, resulting from an acquaintance of twenty years with them. Under his direction I drew a chart of the remainder of the road, which we followed without further trouble.

This road, via Pine Creek, is superior to the old road via Bieber in almost every respect. First, in having a length of seventy miles, while the latter is thirty miles longer. Second, in lying in the midst of timber and meadows, instead of desert. Third, in having but one long grade down the gradual descent into Fall River Valley, and, fourth, in having two stations now available, which divide the road into sections varying from eighteen to twenty-eight miles.

The road via Bieber may have one advantage, that of being kept open during the winter more easily than the other. But of this I cannot speak positively.

For these reasons, I offer the following map as a means of opening a road, which, in time, I believe, must become the direct line of communication between Susanville and Fall River Valley.

The character ♂ indicates blazes on the road.

1. ♂—"To Prattville, Bridge Creek, and Pine Creek."
2. ☉—"To Prattville."

3. ♂—"To Pine Creek." This signboard is in a tree, just where the road turns down a hill, and might easily be overlooked. The right-hand, though fainter road, must be taken.

4. ♀—"To Hog Flat Dam and Pursers."

The Reservoir is a large shallow pond, formed by a dam built across the lower part of Hog Flat, for the purpose of storing water for irrigation in Honey Lake Valley.

5. ♀—"To Susanville." At the foot of a short grade leading down into the northern portion of Hog Flat. The main road leads to the right and out of the flat. The left-hand road runs directly up the flat to McCoy's headquarters, the fence of which can barely be distinguished in the distance.

A dim cut-off of two miles leads back to main road.

Bridge Creek is a misnomer. The stream at its mouth is not more than four and a half feet wide.

Feather Lakes are each perhaps one-half mile long, lined with reeds. Through low saddle to northwest, Mt. Shasta can be seen low down on the horizon, covered with snow. One-half mile further on, a road from Prattville to Grasshopper crosses main road. This is the road north from Prattville, whose existence had previously been denied.

6. ♀—"To Susanville."

Pine Creek flows through northern part of large barren pine, about six miles long and three miles wide, sloping from Feather Lakes to low saddle in the north. Part near Feather Lakes thinly dotted with pines. A small cabin, looking at first in the distance like a horse grazing, is in the center of the barren, near the meadow. On further side of Pine Creek is a small enclosure with cabin. This was formerly Cone's headquarters, now abandoned, the headquarters having been moved about four miles to Harvey Valley. Road passes to east of cabin about 150 yards and crosses road from enclosure to Harvey and Dixie Valleys, a signboard indicating the left-hand road to Fall River.

7. ♂—"To Fall River," "Harvey and Dixie Valleys." The road to Pittville and Fall River formerly passed through Dixie Valley, a hay and stock valley, about six miles long and two wide, exclusive of bench land, but, on account of its roughness, has lately been abandoned.

Rock Springs is a bench of timber, south of road, bordered by a reef of rocks fifteen feet high, fringed with aspens. To find spring, go 150 yards west from signboard to big lone pine tree, fifty yards west of clump of four pine trees, and then back toward reef.

8. ♂—"To Fall River," "To Susanville."

The right-hand road, marked "To Fall River," passes by Jim

Eldridge's, ten miles from Pittville. Take left-hand road, via Poison Lake, since it is shorter, has an easier grade, and has a station nearer at hand. At signboard the road is almost obliterated, but can be seen a short distance to the west.

Poison Lake.—The road to the north of Poison Lake is at times hard to find, on account of the high water, but there are numerous wagon tracks. Go to northwest corner of lake, where a road marked by cattle tracks leads over ridge and directly north two miles to *George Long's Cattle Camp*. This consists of a pond of water enclosed by fence near ledge of rock. North are two other enclosures, one of which contains an empty cabin. To the east, at a distance, is cabin in depression known as Dry Lake.

Black Butte is a low, forest-clad peak, with gradually sloping sides, and somewhat more prominent than other hills around it. It is situated about six miles north of Poison Lake. The road from George Long's Cattle Camp to Jelley Camp and Shird Eldridge's passes through depression to the west of it, while the road from Rock Springs to Jim Eldridge's passes east of it. Black Butte is at the summit of the Sierra range. *Joe Long's Sheep Camp* is to the right of the road, but hidden by trees.

Jelley Camp is an abandoned cabin on the west side of a gulch which runs north and terminates in a cañon leading toward Pitt River. In the gulch are enclosed springs. The road is barely traceable at this point. Two routes are now available to Fall River, one leads directly past the cabin, west four miles to Ward's headquarters. Here pass west through gate, down hill one and one-half miles, to old Fort Crook road, which passes Bald Mountain. This is the shortest route, but the most desolate. To take the second route, cross to east side of gulch, south of cabin, and take road to the north on the ridge above the gulch. This road leads to the dairy ranch of Shird Eldridge, where good accommodations will be found. After leaving Eldridge's, take road north, winding to west around his meadow fence, until the old road from Jelley Camp, through meadow to Willow Springs, is reached. Follow this road a few rods until a new road turns from it to the west and leads up ridge to the west. This road is a cut-off from the old road, and will soon take its place. We followed it by means of Eldridge's wagon tracks. After a gradual descent of eighteen miles, through pines, junipers, and lava, Snell's white house and windmill will appear to the right. From this point take every left hand road for six miles, over the upland within sight of the ranches, until the road winds from north of west to south, and leads along an arm of the valley to Fall River Mills.

J. E. CHURCH, JR.

November 26, 1897.

A ROUTE UP THE MERCED RIVER.

Of the many trips which may be taken from Yosemite Valley as a starting point, into the grand and picturesque scenery of the National Park, one of the finest is a route up the Merced River Cañon, explored last July by our party, with two pack animals, a horse and a mule. Owing to the uncertainty of finding a way up this cañon with pack animals, and fearing, in case of failure, to mislead others, we did not attempt to blaze or monument a route, except in some few places, and having made but brief memoranda at the time, only very general notes of the course can now be given.

Leaving Yosemite Valley late in July, we followed the trail leading to the Tuolumne Meadows by the way of Clouds Rest and Cathedral Peak, to a point about two and one half miles beyond its junction with the Clouds Rest trail, and about one half mile beyond Hopkins Meadow. Here we left the trail and worked down into the cañon of the Merced River, just above Little Yosemite. Our route then lay for some distance over a surface exhibiting the most remarkable evidence of glaciers to be found in this whole region—rounded, billowy masses of granite, beautifully polished and perfectly striated, as though the work had been done but yesterday. The best route here appeared to be about midway between the river and the wall to the left, avoiding the fissured surface of the granite near the former, and the talus of the latter. Proceeding a short distance, it was found advisable to approach nearer the north wall and cross a low spur, beyond which Echo Creek joins the Merced. Coming down to the river, traveling was found comparatively easy through meadows and groves and along cascades, till an inclined, glaciated surface, extending from high on the cañon wall to the river, was reached. To cross the river at this point was not practicable. With sure-footed, unshod mules or burros, it would be possible to cross safely the granite surface, but one of our animals being shod, for us to have attempted it would certainly have been unwise. A way along the river was found, where, with the exception of about thirty feet, there was no difficulty in proceeding. This thirty feet consisted of a granite slope, inclined at an angle of about forty-five degrees, and extending into the river. Across this surface we placed long, slender tamarack logs, firmly supported at their ends. Upon them we lay brush, rocks, and pine needles, and thus constructed a sort of bridge. The results of our work will probably be washed away by the next high rise of the river, but the bridge can be reconstructed with two or three hours' work. Just beyond this point is Lake Merced, a perfect gem in a setting of granite. The next three or four miles presented no difficulties, till some steeply-inclined, boggy

ground, thickly covered with aspens, was reached. Here it was necessary to exercise some care in preventing our animals from miring, and from falling over huge moss and brush-covered boulders. After passing this place, we came to another granite obstruction, similar to that below Lake Merced, and just beyond which lay Lake Washburn. Our progress on the north side of the river was here absolutely barred, but we proceeded as far as we could, then crossed to the opposite bank, and, advancing a short distance on this side, we recrossed at a point fifty or seventy-five yards below the outlet of the lake. This recrossing was necessary, for on the south shore of the lake the talus extends into the water, and renders progress with animals difficult, if not impossible.

Lake Washburn is similar in size and coloring to Lake Merced, but, unlike the latter, which is centered in a park-like opening, this lake approached so near the high overhanging walls, that they reproduce themselves in the silvery water below with a clearness and beauty seldom surpassed in the Sierra.

About one mile beyond this lake, the cañon terminates in a high scarp, or cirque, with perpendicular walls, fifteen hundred or more feet in height, down which, at a distance of about one third of a mile apart, three large streams plunge in magnificent cascades. The first is the Lyell Fork of the Merced; the second, a little further to the south, the main Merced, and the third, still further to the south, the Merced Peak Fork. No possible way of advancing appeared, except up alongside one of these cascades, and a glance showed how futile would be an attempt to climb up the Lyell Fork. On the south side of the main Merced, the ascent would have been comparatively easy, had it not been for a low, but vertical, wall about half way up, which effectually prevented further progress with animals. So we attempted the north side, and with some difficulty found a way up two thirds of the distance, but here advance was barred by a sheer wall. Our only recourse was to cross the cascade and proceed the remainder of the distance on the south side, and it was with some hesitation and misgivings that we attempted the crossing at the only possible place, and where the angle of descent was less than at other portions of the cascade. This crossing, while not particularly difficult at low water, would be attended with great risk at other times, for, if the footing of pedestrian or pack animal should once here be lost, the result would be a fatal plunge for hundreds of feet to the cañon below. For this reason, it is desirable that a way be found up the Merced Peak Fork, and it is likely that this is possible, and the Merced River reached by crossing the low intervening divide.

After crossing the stream, we reached the head of the cascade by working carefully over the glaciated granite of the south side,

and up an improvised stairway, over loose granite blocks, to some large meadows above, which we named the Merced Meadows. These meadows, while not so extensive as the Tuolumne Meadows, are very similar, and particularly resemble that portion of the latter above the Dana Fork. Continuing up the main stream as it bends to the south, nearly to the foot of a fine, rugged peak at its headwaters, we crossed the divide into the basin of the Merced Peak Fork, from which an easy ascent of Merced Peak was made. Returning to the Merced Meadows and crossing to the east of them, we reached McClure's trail, which, though well blazed and monumented, offers little, if any, evidence of travel. A full description of this trail may be found on page 333 of No. 8, Volume I., of the *SIERRA CLUB BULLETIN*, under the title of "Jackass Meadows to Tuolumne Meadows."

To the east of the Merced Meadows, at the foot of the Merced-San Joaquin divide, is a series of table-lands and lake basins, where nestle some of the most picturesque glacier lakes. A traveler in this region should not fail to leave the trail for an excursion to these lakes, and for a climb to the Merced San Joaquin divide, from which, overlooking the basins of the branches of the North Fork of the San Joaquin, a view of Mt. Ritter and the Mniarets may be had, surpassing in grandeur anything else in the whole Sierra.

Returning to McClure's trail, it is easily followed to the Lyell Fork, which it crosses just above the point where the river makes its plunge in splendid cascades into the Merced cañon. At this point we left the trail, and ascended the stream about a mile to an ideal camping spot at a beautiful meadow, thickly bordered by large tamarack pines, which we made the headquarters for trips to Mt. Florence, Mt. Lyell, and Mt. Kellogg. The first two may be ascended without difficulty from this direction, but the last-named presents some difficulties in ascending the last two or three hundred feet, and may be much more easily climbed from the Rush Creek basin. McClure's trail guided us the remainder of the distance to the Tuolumne Meadows. At the McClure Fork of the Merced, we took the "shorter but more difficult way" indicated in Lieutenant McClure's notes on page 334 of the *BULLETIN*. The difficult portion of this route is covered in a mile or more from its junction with the plainer trail which leads west, and the remainder of the distance is delightful.

The whole upper Merced region is a constant succession of charming surprises, splendid forests, beautiful velvety meadows, glorious cascades and crystal, glacier lakes. To me it is the finest region of the Sierra.

ROBERT M. PRICE.

During the past summer Sierra Club cylinders were placed upon the following mountains:—

FREEL PEAK, September 10th, by Mr. Dorville Libby.

MERCED PEAK, July 29th, by a party composed of Mr. and Mrs. R. M. Price, Mr. F. W. Reede, and Mr. Theodore S. Solomons.

MT FLORENCE, August 4th, by Mr. Reede and Mr. Solomons.

MT. HOFFMAN, by Mr. Solomons and Mr. Turner.

CATHEDRAL PEAK, by Mr. Solomons and Mr. Charles A. Bailey.

MT. RITTER, July 10th, by Miss Helen Gompertz and Mr. J. N. Le Conte.

UNIVERSITY PEAK, July 21st, by a party composed of Mr. and Mrs. Charles J. Durbrow, Miss Catharine E. Wilson, Miss Caroline Rixford, Dr. Emmet Rixford, Mr. W. W. Sanderson, and Mr. Harry W. Knoll. The gentlemen of the latter party also ascended Mt. Brewer and Mt. Stanford, placing a cylinder upon the latter peak and leaving their names in the cylinder already upon the former.

BOOK REVIEW.

In the last number of the BULLETIN, we made mention of *Edward Whymper's* "Guide to Chamonix and the Range of Mont Blanc." The Sierra Club has since received, from the same distinguished author, a companion book, "A Guide to Zermatt and the Matterhorn." Everything that was said in the last number concerning the Guide to Chamonix, may be repeated with emphasis with reference to the Guide to Zermatt. It may be that to some persons the work would not possess all the interest of the most exciting novel, but certainly all good Sierra Club members will find it a book to be read with absorbing interest. It is thoroughly illustrated with maps and engravings, contains all the desired information necessary to the tourist, and is crowded with interesting history and narrative relating to the exploration of this region, which the author designates as the "Cream of the Alps."—(John Murray, publisher.) J. M. S.

FORESTRY NOTES.

Edited by Professor WILLIAM R. DUDLEY.

Such a thing as a public forestry policy appears to exist in America, although it is somewhat shadowy when compared with the systems in vogue in the countries of Central Europe. Looking over an important document issued by the United States Land Office, in January, 1897, entitled: "Compilation of Public Timber Laws," one observes that the forestry "policy" presents itself under three phases. The fundamental Act is that of March 2, 1831 (Section 2461, United States Revised Statutes), which prohibits the cutting of timber from any of the public lands for any purpose whatever, except for use of the Navy of the United States, and imposes a punishment for violations of the law. The next is a modification of the above, and authorizes the cutting of timber, first by right-of-way railroads, then by miners, agriculturists, and others, for use in construction or on claims, and this legislation is chiefly embodied in the Congressional Acts of March 3, 1875, June 3, 1878, and August 4, 1892. Lastly, and this is practically the initial step of a new policy, the Act of March 3, 1891, authorizing the President of the United States to make forest reservations. All other Acts and decisions relating to the public forests are extensions of these three principles.

During the year ending with June, 1897, there has been a remarkable exploiting of forestry ideas and agitation of forestry questions, as is witnessed by the following events:—

June 11, 1896: Congress appropriated \$25,000, "to enable the Secretary of the Interior to meet the expenses of an investigation and report by the National Academy of Sciences on the inauguration of a national forestry policy for the forested lands of the United States."

July 2, 1896: The United States Forestry Commission, appointed under the above Act by Wolcott Gibbs, President of the National Academy, began its investigations. It consisted of seven members, including the President of the Academy as an *ex officio* member. The others were: Charles S. Sargent,

author of the volume on Forestry in the Tenth United States Census and Director of the Arnold Arboretum; General Henry L. Abbott, of the United States Engineer Corps; Prof. William H. Brewer, of Yale University; Alexander Agassiz, a large owner of mines; Arnold Hague, United States Geological Survey; Gifford Pinchot, practical forester.

February 1, 1897: The Commission made its preliminary report, recommending the creation of thirteen forest reservations, with a total area of 21,379,840 acres, and situated in the States of South Dakota, Wyoming, Montana, Idaho, Washington, Utah, and California.

Washington's Birthday, 1897: The President of the United States set aside, under the Act of Congress of March 3, 1891, the above thirteen tracts as Forest Reservations. The above recommendation of the Commission, and the action of the President in reserving this large amount of forest land from sale or entry, took the enemies of an honest and economical utilization of the national forests by surprise. The sparsely-settled Rocky Mountain and Cascade Mountain States are largely controlled or "owned" by the lumber and mining companies; and the Senators from these States moved concertedly and with great alacrity against the forest reservations. In less than a week after the President's proclamation, they had secured, without opposition, the passage of an amendment to the Sundry Civil Bill, completely restoring to the public domain all the reservations created on February 22d, except those in California, which were allowed to stand at the suggestion, it is understood, of the Senators from that State. The House failed to agree to this amendment, however, and, as the entire Sundry Civil Bill remained inoperative from lacking the President's signature, the Cleveland reservations came out of the session unscathed. In the extra session which followed the inauguration of President McKinley, the discussion was renewed, prolonged to the end of the session, and was remarkable for the acrimony shown by the Northwestern Congressmen. The opinion of Congress for 1897, on our forestry policy, was finally expressed in the Sundry Civil Expense Bill, passed June 4th. This Act restored to the public domain, until March 1, 1898, all the forest reservations of February 22d, excepting those of California, and appropriated \$150,000 for a survey of all the forest reserves made under the Act of March 3, 1891, besides decreeing certain regulations.

In the meantime, an Act passed Congress, February 24th, providing for the trial and punishment of those who willfully or carelessly set fires in forests.

On May 1st was printed the final report of the United States

Forestry Commission appointed by the National Academy — an important paper, elaborating a national system of forest administration and recommending the creation of two additional national forest parks, to include the Grand Cañon of the Colorado and Mt. Rainier, besides reporting on the existing conditions of the forests of the public domain, and giving the text of proposed legislation bills providing for the above-mentioned forest administration.

On June 30th the United States Commissioner of Lands, Hermann, issued a circular of "Rules and Regulations Governing Forest Reserves."

In addition to the above, a very large number of articles in popular and technical journals have appeared, discussing questions of forestry raised by the President's proclamation of February 22d, and the long debate ensuing. The year has been chiefly memorable, indeed, for active discussion, so far as forestry is concerned, and the probable enlightenment of a larger number who have given this subject but little thought heretofore. In view of the temporary annulment by Congress of President Cleveland's orders establishing the thirteen new forest reservations, and the great danger to which the reservation policy is exposed, the practical gain would appear to be small. But such a subject as economic forestry has everything to gain by a full public discussion, and everything to lose by a restriction of discussion to political circles.

The suspension of the President's orders of February 22d for one year only, from March 1, 1897, makes it probable that the subject will come up again during the coming session, or at least during the life of the present Congress. The vote of the two houses, therefore, in the late extra session, becomes a matter of interest. The test vote, in the debate in the Senate, on the amendment abrogating the orders of President Cleveland, stood 32 to 14 in favor of abrogation. Five days after, on May 11th, and after considerable debate, the House refused to concur with the Senate amendment, by a vote of 100 to 39. It has before been noticed of late years, that the branch of Congress which should show the greatest statesmanship is less conservative of the rights of the whole people, and more the champion of special interests, than the more popular branch.

California is to be congratulated that all the withdrawals of public land from sale or entry (reservations) thus far made still remain uncanceled. The large Sierra Reservation (including

the Stanislaus) extends northward along the Sierra about 220 miles, from near the latitude of Bakersfield to within four or five townships of Lake Tahoe. Reservation of all the government land along the Sierra to the northern boundary of the State, until experts could decide what should be finally withheld for the public good, and what should be thrown again on the market, would be a wise act on the part of President McKinley, and probably would meet with very little opposition from the people of California. A considerable portion of this region has already been mapped by the United States Geological Survey.

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All communications intended for publication by the SIERRA CLUB, and all correspondence concerning such publication, should be addressed to the Editor, Warren Gregory, 222 Sansome Street, San Francisco, California.

Correspondence concerning the distribution and sale of the publications of the Club, and concerning its business generally, should be addressed to the Secretary of the Sierra Club, Academy of Sciences Building, San Francisco, California.



MOUNT SHASTA

(The dotted lines indicate the trail usually followed)

Photo by John Oltman, Sisson, Cal.

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SAN FRANCISCO, JUNE, 1898.

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FROM MT. ROSE TO MT. SHASTA AND LASSEN BUTTES.

BY J. E. CHURCH, JR.

Shortly after Commencement Day in 1897, in company with a party from the University of Nevada, I made the ascent of Mt. Rose, the loftiest of the group of peaks to the south-west of Lake Tahoe. From the summit we saw on the distant horizon to the north-of-west a bold snow-clad mountain, apparently much higher than the one on which we stood. It was a lone butte, pyramidal in shape, and lay far beyond the main crest of the Sierra. I had often heard that Mt. Shasta could be seen on clear days from Mt. Rose, but its nearness puzzled me. This mountain was not over 150 miles from us, while Mt. Shasta, at a conservative estimate, should be 240 miles distant. A lingering desire, therefore, to visit Mt. Shasta, which Mrs. Church and I had had ever since our return from Yosemite, became a definite resolution to solve the doubt by a closer inspection of the mountain in dispute.

The way overland seemed long, and possibly tedious, but was better adapted to our purpose than the speedier trip by rail; for it made possible all the delights of camping and traveling in the very heart of nature. Our means of conveyance consisted of two saddle horses loaded with bed-

ding, cooking utensils, and supplies enough to last us from town to town. The trip was to take twenty-one days, but it was actually thirty-one before we saw home again.

Our course, as far as Susanville, followed, in a general way, the low, broken ridge of the northern Sierra, through vast forests of pine, cedar, and fir, clothing the long divides and extending far down into the valleys. Beyond Sardine Valley, in the midst of rain and snow, we slid down the muddy grade to Loyalton, only to toil upward again from Beckwith into the mist which was still hovering over the summits. In Clover Valley we took our midday meal under the lee of a bleak point where we might be partially shielded from the cold wind. With a homesick protest against the behavior of our dry climate, we pushed on; and our murmuring was soon changed to glad surprise.

Just where Clover Creek enters the gorge on its way to Genesee Valley, we passed through an extensive formation of conglomerates, worn into the most fantastic shapes. We were in the midst of castles and towers tenanted by faces which gazed upon us from the angles and sides of nearly every rock. In the midst of it all, the road was flanked by two large pillars, which formed a gateway through which we passed from the disagreeable experience of the previous days.

The road now accompanied the river in its rapid descent. Before us lay a deep depression, which threaded its way in and out among the ridges until it was lost to our gaze in the sunset glow. Toward this the river dashed in reckless haste down its deep cañon bed, stopping only long enough to gain strength for its next mad rush over the rocks. With almost equal haste, but less recklessness, the road wound its way along a sharp gash in the cañon wall. At

times it descended sharply to the river bed, only to be forced upward again by some sharp point of rock. At other times it was forced to make a wide detour, but just as often would it hasten back to join its companion. Pines, young and old, green and hoary, clad the steep walls from the foaming rapids far below us to the very snow-tipped summit.

Just at nightfall we reached the valley floor and pitched our camp. Here, just as we were preparing to eat our hard-earned supper in the dull glow of the campfire, we had a last, parting shower, which sent us scurrying to get into our weather coats and pick up our perishables. It was soon over, though; and after drying our bedding and warming up our cold meal, we slept soundly, and next day enjoyed a quiet Sunday in a veritable Yosemite.

From this point we journeyed down the Indian River to Taylorville, and thence to Susanville. At noonday, when at the very crest of the range, there loomed up on our western horizon a large mountain answering closely the description of the lone butte seen from the summit of Mt. Rose. At a distance of forty miles it stood forth in solitary grandeur, clear and distinct in its covering of snow. This mountain we knew to be Lassen Buttes, and determined to visit it upon our return.

At Susanville we remained only long enough to secure the necessary outfit for the remainder of our journey. Here we left the well-known roads and passed directly through the wide ranges inhabited by sheep herders and cattle men. The country was an alternation of gentle pine-clad slopes and broad mountain meadows, enlivened here and there by a peak which raised its head a little above the timber line. Here oppressive silence reigned, broken only by the foot-

beats of the ponies. We might travel fifty miles without seeing a human being presuming that we wished to find one. One man, however, we did look up, and found him after much searching among the meadows, although his cabin was near at hand. He was Galen C. McCoy, a man well worth knowing, and full of tales of experience and adventure in the early times. With him we spent a most interesting day, and then, with the aid of our compass, we struck north-west for the settlements in Fall River Valley, sixty miles away.*

We had not gone far before we saw on the horizon a fleecy cloud, which presently took on the outline of the mountain we had so long been traveling to see. And when, after much anxious steering of our course from lake to lake and from stream to stream, we reached Fall River, there, at the end of the vista down the valley, stood Mt. Shasta, its rough lines still melting away in the distance, until it resembled a huge cone with its apex in the clouds. Two days more brought us to our destination through a region strewn with lava boulders so thick and sharp that many places would be impassable were it not for a road. The ground was parched. Rivulets trickling down from the snow-clad slopes were nowhere to be found. The porous ashes and cinders absorbed them all, and did not release them until they burst forth in springs and streams far down where the strata cropped out at the base of the mountain.

Varied feelings took possession of us as we slowly rode round the mountain on our way to Sisson, from which place we hoped to climb its rugged sides. The eastern slope

* A full account of this portion of the trip has been given in the *SIERRA CLUB BULLETIN* of January, 1895.

appeared to be easy; but on the south, the long serrated ridges which formed the bulwark of the mountain and led directly to the summit, seemed, with their towering pinnacles, to defy any attempt in this direction. The clouds, also, hovering lightly round the summit, made the rocky mass appear a veritable fortress of the gods, whose battlements no mortal might scale. Yet, up this very slope we were destined to make the ascent.

We reached Sisson on July 7th, and at once began to make arrangements for the climb. At first every one dissuaded us from the attempt, urging the heavy snow-fall and the storms which were still raging about the summit. We ourselves were almost on the point of giving up the ascent, when our guide consented to make the attempt next day, if only the clouds would leave the mountain.

The next day was fair. We rode up the narrow, rocky trail through the timber, and finally reached the dwarfed, straggling trees that mark the end of vegetation and the beginning of snow and ice. Here, at an altitude of 8,000 feet, we lay on the pebbly ground near a burning log, and slept till dawn. The guide's daughter had accompanied us thus far, but finally decided to remain in camp.

Our equipment for the day's climb consisted only of absolute essentials: cold cream and dark glasses, to avoid the effects of glare from the snow; a coil of rope for use in slippery places; and heavy coats, in case a fierce wind was encountered on the summit. For food, we filled our pockets with crackers and chocolate, as having most nourishment and least weight. Our heaviest burden was a canteen, which we filled at the only spring on all the mountain side.

At six o'clock, supported by heavy pikes, we began a

weary climb of seven hours straight up the snow, which melted enough with the sun's warmth to form a soft, yet firm, pathway for our feet. We were climbing up the bottom of a steep, snow-filled valley, flanked on either hand by sharp, serrated ridges, leading directly up to a projecting point on the old crater-rim known as Thumb Rock.

We kept in the middle of the crater to avoid the falling rocks, which the freezing and thawing of the cliffs caused to be hurled down with a sound resembling the sharp crack of a rifle. On reaching the last and steepest part of this ascent, we found the snow so hard that we could scarcely gain a foothold, and a misstep meant a sudden slide down among the rocks that projected from the snowfield. We sought, therefore, somewhat more secure footing on a reef of loose stones, which brought us safely nearly up to Thumb Rock.

We had now surmounted the worst obstacles, when my wife, who had become exhausted by the altitude and the recent difficulties encountered, insisted that she be permitted to continue the climb by herself to Thumb Rock, while the guide and I hastened on to gain the summit while time permitted. We had not gone far when a stone turned beneath my feet and went rolling down the mountain. I thought every moment that it would stop, but every bound only accelerated its speed, until it went like a cannon-ball in its wild course over the rocks. I immediately thought of my companion sitting on the reef directly in its path. But nothing could be done, and I stood weighing the chances of its flying off to one side. Hearing its rumbling, she had now jumped up, and I could see the rock pass her a few yards to the right.



LOWER OR CRATER SUMMIT OF MT. SHASTA

Photo by John Olman, Sisson, Cal

On reaching Thumb Rock, we paused a few moments to gaze into the giddy depths; then casting aside rope and canteen, we hastened up the remaining 1,500 feet over Black Hill, and came out upon the level top of the mountain. This had formerly been the principal Shasta crater, perhaps about a mile in diameter. Its walls are now entirely gone, except a small fragment on the north-east side. On this narrow ruin, 14,444 feet above the sea, the Coast Survey years ago erected a small sheet-iron pillar, surmounted by a bell-shaped reflector, intended to be used in the triangulation of this region.* It was to this "monument" that a horse, chartered by the Examiner, was said to have climbed last season, and that, too, with a young lady on its back. If it did so, it must have been a Pegasus, or been assisted by rope and tackle part of the way at least.

The lower, or so-called Crater Summit, which forms the western spur of the main peak is a typical crater, surmounted by a low cinder cone. It was so thoroughly extinct that there was a frozen lake near the outer edge. This summit is easily accessible from the one above, but being 2,500 feet lower down, the exertion of returning prevents nearly all mountain climbers from visiting it.

Our first task was to clear the ice from the record book and record the unusual weather conditions by which we were favored. The air was perfectly calm, and the sun shone as warmly as in the May days. Such a condition at an altitude of 10,000 or over have I found only twice out of six times. From the record, but one ascent earlier in the season than the present one had been made in any year, when four guides, including my companion, had carried

* The device was found to be utterly worthless for the purpose, and the reflecting bell is now completely tarnished.

fireworks to the summit one Fourth of July several years before.

During our upward climb, the horizon had gradually been receding, until there was an uninterrupted view for nearly 200 miles in every direction.

To the south we could trace the Sacramento Valley, its air tremulous with the heat, almost to Sacramento.

To the south-east, as far as the eye could see, the landscape was a mere billowy waste of mountains, unbroken save by Lassen Buttes in the foreground. On the horizon, and almost lost in the haze, I could discern a minute rounded summit. It may have been Mt. Rose. To the north the Sierras gradually dwindled away until they were merged into the Cascades.

An hour and more had quickly passed. It was now 3 p. m., and we must hasten down. Under no consideration could we remain on the mountain over night; for without fire we must surely suffer. Just below the "monument" we visited some hot springs, just a remnant of the hot times when rock instead of water was boiling at the same place. We gathered a few specimens and hastened on.

While coming down Black Hill, my pike slipped from my hand, and I went sliding over a precipice and into our old crater below. So I had to move cautiously along, depending only upon the nails in my shoes. After a few slips and slides with safe recovery, we reached Thumb Rock, and found Mrs. Church awaiting our arrival. She had succeeded in reaching the altitude of 13,000 feet, but declared that height to be her limit.

The snow slope, which had now been softened considerably by the sun, extended from this point without a break to within half a mile of our camp, and would afford us a

quick, smooth passage for three miles if we would entrust ourselves to it. The example of the guide sliding away from us brought us to a decision. We laid a barley sack upon the snow, sat down tandem upon it, held our feet straight before us as snow catchers, and dropped swiftly, yet safely, toward the lower levels. We reached camp within two hours after leaving the summit, although we had spent seven toiling up.

The young lady who remained in camp had a far different experience. A mountain lion came through the camp, sniffed at the horses, and after giving its characteristic childlike wail, departed, leaving the young lady unnoticed and the dog shivering with fright near a snow-bank.

We quickly saddled our impatient horses and descended through the twilight 5,000 feet more to Sisson.

We were tired indeed, but started next day on our return trip down the cañon of the Sacramento River to visit the beautiful Shasta Mineral Springs and the famous tavern at the foot of Castle Crag. When we came into the yellow fields, with their stately oaks so like those of our native State, we were happy. But soon the intense heat drove us to other thoughts, and not even the delicious fruits could stay our progress toward the cooler pines and mountains we had but recently left. We turned directly east from Anderson, and began to ascend the long lava slopes surrounding Lassen Buttes, the next goal of our journey. Arrived at the Buttes, we spent three days amid very interesting surroundings. One adventurous climb was in search of Bumpass' Hell, or, as I should call it, the Devil's Kitchen. Here pots of mud and mineral paint were slowly boiling and slopping their contents over their sides; then a huge tea-kettle was puffing merrily; while steam came hissing and

screaming from the vents of a steamer under the cliff. On the other side of the "kitchen" a large reservoir, filled with hot water from the springs and cold water from the melting snow, provided a comfortable bath. The ground all round the springs was salt, and one had the sensation of breaking through as he passed from one boiling spring to another. No wonder then that Bumpass, an old trapper, who fell through and scalded his feet in the boiling mud, when asked about his mishap, said that he thought he had been to hell. So this place took his name and his designation; but recently the Government substituted for this popular term the less interesting name Bumpass Hot Springs.

The next day I climbed alone to the top of Lassen Butte (10,400 feet high). This butte is a cinder cone, surmounted by a cap of shattered rock, which thus far has resisted the pulverizing efforts of nature. The sides of the cone, however, are beds of yielding cinders so steep that it would be almost impossible to gain a foothold in them. But on the south eastern edge, heavier strata crop out and form a cinder path directly to the summit, up which a horse might be taken.

From the summit I could look down into other old craters, black as furnaces, dotting the ridge to the north and the south. Each of these formed a peak or butte by itself. Therefore, I suppose, the plural designation, Lassen Buttes, was given to the group.

But most charming and longest to be remembered were the lakes lying nestled among the wooded slopes—gems of emerald and crystal in their settings of rock.

I took a long farewell of old Shasta, which was only one hundred miles away, and frowned all things else in that direction into insignificance. Yet I had to look carefully

to distinguish its white outlines through the hazy atmosphere which encircled it. Therefore, it seemed probable that if it appeared so indistinct from Lassen Buttes, it could not be seen at all from Mt. Rose, which was twice as far distant.*

The remainder of our journey was uneventful. We rode continuously for six days through the Big Meadows, Indian, American, Mohawk and Sierra Valleys, in order to reach home by the end of the week.

On Friday, being mindful of the old adage that "Last impressions linger longest," we wished to make our last camp at Lake Independence, amid most beautiful surroundings. But when three miles distant from the lake, we found nailed to the signboard the following legend: "Campers not allowed." Since our appearance placed us decidedly in that class, we turned sadly away. But there was a comfort in our disappointment; we would the sooner reach home. So we retraced our steps, and after a last night among the hills, descended once more with strengthened minds and bodies to resume our daily tasks.

* On October 30, an unusually clear day, I ascended Mt. Rose to search a last time for Mt. Shasta. The recent fall of snow upon the higher peaks gave me a means of determining the relative heights of the mountains. The lone pyramidal peak seen in June was not over 8,000 feet high, and was too far west to be even Lassen Buttes. It is probably Sierra Butte, near Sierra City. But directly northwest, and much farther away, Lassen Buttes could be seen for the first time. I gazed long and intently at the sky directly beyond them where I had hoped to get a glimpse of the towering summit of Mt. Shasta, but my sight could not penetrate the faint mist on the horizon. I was convinced that Mt. Shasta would never be seen unless the atmosphere were phenomenally clear, and such occasions would only occur in the depth of winter. But even then success would be improbable, for the greatest distance at which observers have been able to signal—from Mt. Shasta to Mt. Helena, 190 miles—is 40 miles less than the distance now sought to be traversed.

A YOSEMITE DISCOVERY.

BY CHARLES A. BAILEY.

That there are three superior points of observation in Yosemite has long been accepted as a well-attested fact. That there should remain undiscovered a fourth point whose base upholds a well-beaten trail and whose summit, but a stone throw from the trail, commands a view to be classed with that of Inspiration Point, Glacier Point, and Cloud's Rest, may well awaken our interest and surprise. Nor is that surprise lessened when we consider that Yosemite has been continuously ransacked by zealous devotees whose search for every charm has been characterized by the greatest daring and enthusiasm.

A characteristic common to the three noted points mentioned is the scope afforded the vision. One is impressed with magnitude and variety, but detail is lost in immensity.

The wealth of beauty in Yosemite is found in her living, leaping waters and their immediate surroundings. Come in touch with them, beauty unfolds, becomes expressive and radiant. The best point to behold beauty, then, must be near the spot where most waters boldly leap from the finest heights and tumble and swirl along the most rugged depths.

After many clamberings in Yosemite, the idea became an absorbing one: how remarkable and delightful such a point would be, especially if from it the vision could embrace five such waterfalls as Upper and Lower Yosemite, Vernal, Nevada, and Illilouette.

With this end in view, the expansive heights and depths of Glacier Point, and the uplifted, ragged rim from Royal Arches to Eagle Peak were sought and traversed without avail. Springing from out the long flank of Half Dome, peering among the cañons, was the defiant and untrodden Grizzly Peak. Here the obstacles were great, but the incentive was greater, so the only known ascent of Grizzly Peak was accomplished, but the reward was incomplete. Vernal and Nevada were near, and thus more beautiful. Upper and Lower Yosemite were clearly seen, but the Illilouette was partially hidden behind a cliff.

To Walter E. Dennison, a most worthy mountain companion, I suggested the idea for a further search which he heartily approved.

Rough triangulations were then made to locate the converging point of the lines of vision of the five waterfalls. This led to the selection of the flank of Grizzly Peak.

An invitation was then extended to Mr. Andrew Dalziel to accompany us, which he accepted. Up the long sweep of talus, over the stragglings benches, out and along Grizzly's flank, down to the humble abutment where the rivers join; there the idea was wrought into the ideal.

On that lowly crag one may stand without change of position and behold those five wondrous waterfalls—a crag adding completeness to Yosemite visions, and one that will ever endear itself to the appreciative who haply may find it.

That this point might no longer remain incognito, but be known to all lovers of Yosemite, on June 14, 1897, accompanied by Walter E. Magee and Warren Cheney, of Berkeley, by right of discovery shared by W. E. Dennison, I deposited thereon Register Box of the Sierra Club, No. 15, and took the liberty of naming it Sierra Point, in honor of the Sierra Club, and raised a flag bearing the name.

The day following, I was accompanied by those two noted veterans, Professor Joseph Le Conte, of the University of California, and Galen Clark, of Yosemite, also by Percy Gaskill, Raymond and Bryant Bailey, the latter aged 13.

We were soon joined by Mr. H. L. A. Culmer, of Salt Lake City, and by Miss Charmian Kittredge, who was the first lady to make the ascent.

For the guidance of others, I monumented three rough pedestrian trails thereto, each starting from the Vernal and Nevada trail; one opposite the Happy Isles, about seventy-five yards below the drinking tub; another a little below Point Rea; the other just above. The upper trails are shorter, and encounter less loose debris.

Within a few days after the raising of the flag, the ascent was accomplished by eight ladies and others. It may be leisurely made in about forty-five minutes.

On July 12th, at a regular meeting of the Yosemite Commissioners, in recognition of services rendered and the great interest manifested in Yosemite by the Sierra Club, Sierra Point was officially christened, and so let it be, for perhaps no other point can more worthily bear the name.

Perched on the eastern edge of the great flank of Half Dome is a singular granite wall. Sharpened to a ridge on top, its base spreads out several hundred feet. Its length may be several thousand feet, its height five hundred.

At the upper end is the abutment that withstood the glaciers that cut down the wide-spreading flank of Half Dome, and left the bare, inclined western portion of this wall, which no man can scale.

At the lower end is the abutment that breasted the rushing volume of the combined plunging waters, now extending down to the river's brim. Its eastern face is

furrowed, seamed and broken into irregular blocks, resting one on the other, which at any time may fall in greater mass than that avalanche which recently crashed in thunder from Glacier Point, moved the forest, covered with its dust the Happy Isles, and darkened the sun from the Royal Arches to Casa Nevada.

The base of this wall is so inclined that the upper part exceeds the lower 1000 feet in altitude.

The lower or southern end of this wall breaks away in benches, contracting to narrow ledges at its sheer western side, and broadening out against the abrupt edge of its eastern side. The upper abutment forms Grizzly Peak; the lower abutment forms Sierra Point.

The surface of this point is triangular—shrinking from forty feet wide to a sharp angle in a length of 100 feet, and is covered with broken rocks, hurled from above. One rock furnishes water immediately after a rain—others form a rough-hewn sepulcher—among others spring two Douglas spruce, one of which bears the flag.

Crouching so low among the mighty as to be in almost perpetual shadow, is this remarkable point in Yosemite.

Grayer than Sentinal Rock, uncouth as Indian Cañon, low as Royal Arch, obscurity seemed to be its destiny. Apparently unworthy of name or notice, no one clambered its side or sought its summit. The only attention it ever had was the blasting from its side of the Vernal and Nevada trail.

It stands at the junction of the Merced and Illilouette cañons, and there it stood, ragged and sheer, while the mountains were shattered and the gorges were hewn when Yosemite was born.

Its easiest ascent demands a climb; its very summit is

broken and angular, and there, from an area of about one yard square, and from there only, and in their greatest relative nearness, can be seen those five great waterfalls of Yosemite.

Nearest eastward is Vernal, in all its beauty; above and beyond, Nevada. Southward is seen the full length of Illilouette Cañon, in its bare ruggedness, with Illilouette Fall in profile at its upper end. Westward are seen Upper and Lower Yosemite Falls; also Eagle Point, Yosemite Point, and Lost Arrow.)

Down the cañons wind the rivers and extend the forests. Creeping up the opposite heights to a like altitude are piles of talus. The new lie exposed against the cliffs, the old are buried among the pines.

Nor are the pines sepulchral. Scrambling up the great walls, lining ledges, standing in niches, surmounting pinnacles, grasping rocks of high place, in stateliness they flourish and adorn.

Across the cañons are the massive, towering walls of Glacier Point and Panorama Rock, meeting at a right angle, the angle broken by the rugged cañon of the Illilouette.

Sweeping grandly down is the great corner buttress of Glacier Point, supplemented by a series of seven others so securely laid that old Popocatepetl might rest firmly on them.

At your feet the cañons join, and the waters meet to go dashing together in the swelling Merced; behind is the upward, sprawling sweep of Grizzly Peak.

At hand are the Royal Arches, North Dome, Washington Column, and absorbing details of beauty and immensity. The Cap of Liberty stands forth, flanked by Mount Brod-

erick; Casa Nevada nestles at its feet, ever enriched by the beautiful Vernal and Nevada. The choice of Yosemite is about you; the waters are gathered to sing their loudest refrain while beauty triumphs.

Comparatively humble as Sierra Point is, it may become more humble still, may crumble to the sands that lie at its base, and yet forever remain the same, for it is the converging point of vision of the five great waterfalls.

Do you want a vision? An exalted ambition will lead every lover of nature there to see, for there the receptive soul may thrill and expand, and thence bear away beautiful memories forever.

To Cloud's Rest we may ascribe the most comprehensive view of the Sierra; to Glacier Point the most complete view of Yosemite cañons; to Inspiration Point, an inspiring view; to El Capitan we will bow as the colossal greeting and farewell, and yet declare that Sierra Point is the point of beauty, the one altogether lovely.

ASCENT OF THE WHITE MOUNTAIN OF NEW MEXICO.

BY LIEUTENANT N. F. MCCLURE, U. S. A.

On almost any clear day, if one climb to the top of the water-tower at Fort Bliss, Texas, and look to the north-northeast over the great plain lying in that direction, he will see, above the distant horizon, a single peak. It is the great White Mountain or Sierra Blanca of New Mexico. If asked how far it is, the uninitiated would say about fifty miles, and would estimate its height at 8,000 feet. But distances and altitudes are deceptive in the clear atmosphere of the Southwest. It is 112 miles away in an air-line, and rises to a height above the sea level of 12,000 feet. It is one of the grandest mountains in New Mexico, though several higher ones may be seen in the northern part of that Territory.

On November 1, 1897, my troop, "A," Fifth Cavalry, Captain A. C. Macomb, commanding, started on its annual practice march from Fort Bliss, Texas. On the 6th we camped at the Mescalero Indian Agency, a beautiful spot among the pine forests of the Sacramento Mountains. From this point to the summit of the White Mountains, by the shortest route, is twenty miles. I had often longed to scale that majestic mass, and the opportunity had at last arrived. Owing to an unfortunate accident to one of our men, we remained in camp on the 7th and 8th. We were to begin our return march on the 10th; so this left us the 9th only to devote to the journey. At 6 A.M. on that

day, Captain Macomb and I, with two of our men and an Indian named Marion as guide, left our camp at the agency and proceeded north up one of the cañons coming down to the main stream near that place.

It was bitter cold, but after a ride of five miles through beautiful pine forests similar to those of our beloved Sierra Nevada, we came out on the main divide, and, the country being here more open, we began to feel the warmth of the tardy sun. There was something exhilarating in that dry, cold, crisp atmosphere, and, well-mounted as we were, we could not help feeling the beauty of the panorama of forest and mountain now unrolling before us.

After traveling three miles farther, the formation became different, the ridges grew more rocky, and the pines and firs changed into scrub oak in such thickets that riding became quite difficult. Here turkeys and deer abound. We killed several of the former, but none of the latter. After getting out of the first cañon, we kept on the main divide, bearing a little west of north, and gradually ascended, until Carrizo Spring, fifteen miles from the agency, was reached. Here the timber practically ended, and the next five miles lay up the rocky ridge leading to the peak from the south. In places snow covered the ground, rendering the traveling difficult, while a sharp wind which had sprung up made the atmosphere biting and chilly.

It was 2:05 P. M. when we finally dismounted at the foot of the last steep slope, and left our horses sheltered in a sunny nook on the lee side of the main ridge.

The summit now appeared to be about 200 feet above us, but we called it 1,000 by the time we reached it. It was 2:40 P. M. before we stood beside a large granite monument on the extreme top, and gazed in wonder

at the scene of grandeur unfolded to our view. It was singularly clear, and the field of vision was limited only by the rotundity of the earth. To the north gray hills and plains, alternating, gradually shaded away into the great peaks rising near Santa Fé and Las Vegas Hot Springs. To the northeast, and comparatively near, could be seen old Fort Stanton. To the east for many miles lay timbered mountains, which gently sloped away into the valley of the Pecos River, and this in turn merged into the Llano Estacado, or Staked Plain. To the southwest rose the Guadalupe mountains, amidst whose arid, barren slopes a squadron of my old regiment, the Fourth Cavalry, once underwent great hardships through the incompetency of a guide, being three days and two nights without water. To the south the Hueco mountains could be seen 100 miles away, and beyond these, peaks of some of the ranges of Old Mexico, 150 miles distant, were dimly outlined. Thirty miles to the west lay the San Andrés Mountains, and south of these, in succession, came the Organ Mountains and the Franklin Mountains. At the southern end of the latter are El Paso and Fort Bliss, 112 miles as the crow flies. Two objects on the desert to the west deserve special mention. One is the "White Sands," a great field of granulated gypsum, fifteen miles wide by thirty long. This gypsum is almost pure, and the wind has collected it into great cream-colored (almost white) drifts, some of which reach a height of over fifty feet. This wonderful formation lies on an otherwise open plain, and how it came there no man knows. Measurements made at its eastern border show that it is drifting eastward at the rate of twelve feet per year.

To the north of the "White Sands," and covering the

plain for a distance of twenty-five miles in length and six in breadth, lies the "Mal Pais," or ancient lava flow. It was distinctly visible from one point of vantage, but as I have never been nearer than on that day, I will attempt no description of it.

Stuck in a crevice of the granite monument, we found a tin can with the names of a number of students of the New Mexico Agricultural College written on a piece of paper therein. We put our names "on the list," though our hands were so numb from the cold that we could scarcely write. For this reason, and on account of the limited time, we tarried but a few minutes on the summit.

It was 3:15 P.M. when we reached the spot where we had left our horses. The short November day was rapidly coming to a close, when we again drew rein at Carrizo Spring, and we determined to take a different route back to camp from this point. We knew that traveling through these heavy oak thickets after dark would be nearly impossible. We now started down the little stream from the spring, and were soon in the depths of a mighty cañon. It was long after dark before we emerged into the comparatively open country and turned south. Fortunately, the moon was shining, and we now began to make time. Our guide never faltered. On and on, over meadows and hills and valleys, through underbrush and forests, he held his way. It was bitter cold, and I had no overcoat, but by jumping off my horse and leading for a half-mile now and then, I managed to keep from freezing.

It was nearly 10 P.M. when we finally rode into camp, tired, chilled and hungry, but feeling that the journey had been well worth the hardships encountered and overcome.

The White Mountain is the main peak of a range called

"The White Mountains," in south-central New Mexico. There are a number of peaks in that Territory on the great ridge running south from Colorado which are higher than Sierra Blanca, but I venture to say that from none of them is there such an extended view as the one which we enjoyed that day.

To the west of the peak we noticed a large, square-shaped patch of thick fir forest growing in a cañon a thousand feet below the summit. So regular in form was it, and so well-defined were its ledges, that it appeared almost as though planted there by the hand of man. The thickness of the branches was attested by the heavy snow lying unmelted beneath them. We were struck by the small quantity of snow at other places on or near the top, and by the amount of luxuriant grass growing all the way up, even to the very summit.

The view from the White Mountain is remarkably open and unobstructed. Like Shasta, it stands so far above everything within a hundred miles of it that all else appears insignificant when compared to it. Its name arises from the fact that during eight months of the year the highest part is covered with snow, which is quite notable in a warm, dry country. In many places in New Mexico they will tell you that Sierra Blanca is 14,000 feet high, but I am inclined to believe that it is but little, if any, in excess of 12,000 feet.

A DAY WITH MT. TACOMA.

BY BOLTON COIT BROWN.

Stage loads upon stage loads of Mazamas moving toward Mt. Tacoma had reached Longmire's Springs. Pack-animals with tents, and Captain Skinner with his restaurant, had gone up ahead to the snow-line in Paradise Park. The main body was to follow and camp there to-morrow. But my time was limited; "large bodies move slowly;" and since it was but 3,000 feet, I went up myself that afternoon.

Surely an Esquimau must have named it "Paradise," for its arctic surroundings. The altitude is 7,000 feet, and now in the middle of July the ground was half covered with heaped snow, while far below, in their deep gorges, flowed glaciers. Above, the mountain was simply sheathed in snow-covered ice-rivers that flowed down from the vast rounded summit—as once lava did—and broke into iceberg-cascades and stupendous ice-cliffs on a scale of fearful and amazing bigness.

The tents were so pitched as to make the most of the poor shelter given by the last few groups of spruce trees. I had in mind to rise very early and make a push for the summit on the morrow, returning the same day. Thus I should be back at the Springs on time for a certain stage. No one had been up this year; but I knew the route from at least three or four careful descriptions of it by persons who had been over it. I once ascended Mt. Shasta in this way, climbing more than 6,000 feet of wind-swept slopes. It was a very snowy season, and deep snow lay far below

the timber line. Yet I got up, alone, the first ascent of the year, too, and without the slightest serious trouble. There was cold wind, fatigue and nausea—that was about all. There seemed no reason why I should not try Mt. Tacoma in the same way. When I mentioned my plan to Captain Skinner, he told me that several such ascents had been made, one of them by a man who had neither ice-axe nor alpenstock. Though I am but an amateur mountaineer, yet I thought I could at least try to do what these men had done. And the Captain—"an elderly naval man," with a hopeful face, a white beard, and a head that experience has leveled, and the ability to distinguish between mere possibilities of awful things and the actual chances of having them happen to you—he said he thought I was all right to try, and that I should probably make it.

Towards midnight I crept into my very inadequate sleeping bag, and shivered away a miserable period in the corner of the tent. I may have slept an hour. At one I called on Captain Skinner, and, while I dressed for the march, he actually rose from his warm blankets and cooked me a hot breakfast, which is a thing one fully appreciates when about to attack the last 8,000 feet of Mt. Tacoma at 2 o'clock in the morning.

As we stood outside the tent, the weather showed none too promising. It was warmish and damp, with some solid-looking clouds obscuring the moon and stars. Still, there was a fair chance that it would clear off, and I decided to start. I looked towards the great peak but it was clothed with darkness. I paused and waited; and it chattered its cold teeth at me, and the echoes told of falling rocks far up among the desolate solitudes.

My provisions were a lunch of dried fruits and meat,

with some cheese and a pound of chocolate in my pocket. Of course I carried smoked goggles and strips of black cloth to tie over my face on the snow. I wore two complete suits of Jagir's heaviest underwear, besides a thick woolen camp-shirt, an ordinary suit of clothes, and a pair of blue overalls, lashed at the calf with a string in place of a legging. Also, I had a good alpenstock.

The peak lay to the north, but in order to avoid a basin that looked suspicious in the dark, I first trudged over the snow a mile eastward. Then I came to something like a white granite wall or ledge. It proved to be the edge of a great glacier. I got up on it, and its smooth, broad surface furnished excellent walking. Turning to the north, I now moved over this deep ice pavement towards the peak—visible only as a place in the sky where there were no stars. Over the underlying mountain form the glacier undulated in a kind of huge billow. To get around the face of one of these, hundreds of feet high, I went some distance westward and climbed to the surface above by a cliff of rocks.

Here I was about 8,000 feet high. The clouds had decreased. The moon in her last quarter cut with keenest brilliancy against the black sky; and Venus, the morning star, shone with extraordinary brightness. Beyond the serrate shoulder of the mountain the faintest suggestion of dawn could be detected. Often I paused just to stand and feel the majesty and the solemnity of the time and place. Sometimes I lay flat on my back and gave myself up to the nameless exaltation and exultation that such a mountain and such a morning bring to the heart of the nature lover. Every man to his taste, but I love the lonely climb, never yet lonely to me.

An hour of steady work, mostly backwards, since that

was less cramping, and I reached a small archipelago of rocky islets. Rounding this, I took my bearings—it was lighter now, and the sky wonderfully beautiful—for Gibraltar Rock, a mile away. Though I finally reached it, lack of training showed in my poor speed. Then came cliffs and chutes and tumbles of rock, much like those we had on Mt. Williamson, only these were not so steep. It is all volcanic, and forms most unpleasant footing, and equally unpleasant handling. The slope was steep, and a cold whistling wind fought me every step.

Reaching at last the place they tell about—under Gibraltar Rock—I clambered cautiously out, hugging along under overhanging rocks a thousand feet high, while below me things dropped hundreds of feet to a mass of blue crevasses. The going required care,—and received it. Rocks rattled from the cliffs overhead, and shot like meteors through space beside me. But I was too close under the wall to be hit. One was so swift I did not see it; I heard a *whizz!*—like a quail going ten times as fast as common—that was all. The places where drippings had iced over the slope called for especial caution. I got on well enough, but there were several rather wicked gulleys. At one bad one the broken ends of a last year's rope now dangled.

Some two hours of this work brought me to the worst place of all, where you get in the angle between rock-wall and ice-wall. Down the chute which this angle forms is a regular discharging-route for all the rocks that get loose above. One must cross the bottom of this and then climb an almost upright face of snowy ice and icy snow, more or less thawed and more or less covered and disguised by dirt from the cliff above, and thickly bestuck with insecure

rocks and stones,—the whole more or less rotted by sunshine, and more or less undermined by the water rushing beneath it.

As I studied it, I was glad I had picked up and brought along a discarded hatchet. People are supposed always to get past here before ten o'clock; but it was now after eleven, and for an hour the sun had been loosening rocks to shoot themselves down that throat. Still, there was less bombardment than I expected, though what stones did come, came with an appalling *whizz!*

It was no place to fool around and wonder, and I instantly commenced cutting my way across the bottom. Then in the same way I started up the hummocky ice-slope on the west. For a hundred feet I cut every step, and then crawled over upon the surface proper of the glacier. Though this was very steep, yet one could just manage to ascend without chopping footholds. Practically the last of the rocks were now passed; the rest of the mountain is armored hundreds of feet thick in one vast ice-cap, split, where the slopes favor it, into awful crevasses.

I was so tired, and the air was so thin, and the wind so furious, that I crept slowly on hands and knees, resting ever few feet. My hat I tied on with a big bandage, that somewhat protected my face. Above rose two glistening ice-cliffs, the upper lips, as it were, of two crevasses, with a smooth gateway between them. A few minutes after crawling through this gap, I looked clean over the top of Gibraltar. Good! I was 12,000 feet up, all the bad climbing had been done, and it was hardly past midday. But the summit heaved itself still 3,000 feet aloft.

From here the ascent would, ordinarily, be simply a tramp. There are abyssal crevasses, it is true, but they

are big enough to slide a village into, and easily avoided. I felt a little nausea, and had eaten almost nothing since breakfast. Twenty-five hundred feet above and a mile away a shining ice-wall rose from the smooth baldness of the white snow. It was the upper edge of a great crevasse. Though similar ice-ridges appeared below and about me, yet between me and that one the surface stretched in one unbroken sweep of frozen snow. Straight down this slope rushed the fierce wind, and along the bottom opened one mighty, blue ice-throat, the greatest of crevasses, probably hundreds of feet deep.

The sun could only thaw the first half-inch or so of the smooth snow; and even this half-inch was now decreasing, since it received constantly less and less sunshine. It was extremely difficult to get a foothold. And, besides, when I stood up I felt as if the wind might overcome my adhesive powers, and whisk me down into the crevasse. So I went at it on hands and knees. Holding the alpenstock near the middle with both hands, I struck it transversely, flat, into the surface of the crust, and then moved my knees up to it. Then holding from a slide by sticking in my toes, I lifted the stick and again stuck it down and carefully crawled up to it. Yes, and even so I had to rest twice to the rod. The surface grew constantly harder, and the gale blew icy cold. When I had made 500 feet above Gibraltar, I calculated that, even if I succeeded in keeping up my present speed, I should be five more hours climbing that slope. The air was painfully thin. Harder grew the snow; more savage and cutting the blast. Merrily bits of glittering ice swept tinkling by, flying or racing for the crevasse. I wondered, if I did not hold on, if I should lie there or slide down. I tried it and—*I slid*.

Still I crawled on,—a few feet and then a rest, a few more and another rest. As a quadruped I bore my weight on the tops of my fists, wherefore I had lame and swollen wrists the next day. My leather gloves, soaked, of course, froze as stiff as tin gloves. By accident I discovered that my fingers were also beginning to freeze; whereat I stabbed the alpenstock deep and straddled it while I thawed them into tingling aches that wrung from me some small groans. Then I crawled again.

At last Gibraltar looked a thousand feet beneath. I had reached 13,000 feet. For hours not a spot of the earth had been visible—barring three remote peaks. I looked down a vertical half-mile, and far, far out on an unbroken sea of fleecy and most beautiful clouds. As far as vision reached, this soft cloud-ocean tossed its cottony crests, and swept steadily and swiftly towards the southeast. There must have been 20,000 square miles of it in sight. It might mean storms below. Overhead hung the indigo vault, and the sun shot dazzling light. Just above the top and close to it there formed at times a lace-like film of cloud. Right over my head it scudded with a speed more like a waterfall than a cloud. As I rested astride the thick ash staff, a low, steady, musical note came to my ears. At first I thought the glacier must somehow be making it. But it was the alpenstock humming in the gale.

By this time it had become evident that if I gained the top I must stay all night in the crater. This I did not wish to do; and, more especially, I did not wish to get storm-stayed up there. Moreover, I did not know how bad the wind was capable of blowing, but I knew that if it blew much harder it would simply blow me down the slope and into the crevasse.

All things considered, then, it seemed wisest to turn back and descend while I yet might. I dared not go down with the regular glissade, for fear of slewing round and losing control of myself. I squatted, or sat, on one hip, and, holding for my life to the staff, edged slowly down. I kept wondering how I should fare in running the batteries of flying stones at that hour. By the time I got there, however, the sun had softened the ice and snow, and the passage proved altogether easier than I expected. Some rocks fell, not many,—also some big icicles. A stone the size of a small stove hustled over my head, but already I was close under the protecting walls of Gibraltar Rock.

Having ample time, I took it very easy; and it was probably four o'clock when I reached the last rocks of The Cleaver, and prepared to traverse the great snow-surface of the glacier. And here were the clouds. I noted the position of the sun, the peak, the direction of the wind—now much milder—and the run of the snow furrows. Thirty paces from the rocks I could see nothing but the snow at my feet. I supposed the clouds formed a sheet a few hundred feet thick and that I should soon come out below it. All I could see was an impenetrable, luminous mist. Once there appeared in the air very near me a lovely double rainbow.

I reached the island of rocks at which I had aimed, and thence set out for another that I hoped I could steer to. In general, thirty feet was the limit of vision in any direction, though occasionally a fleeting glimpse of the pale sun disc corrected or confirmed my line of march. The rocks did not appear. After a while the surface began to tilt steeply down to the left* and the furrows to run across the

* I have reason to believe that this was the declivity down which Professor McClure slid and was killed.

wind. There came to me a faint memory of something like that, with crevasses at the bottom, seen in the early morning. I sheered to the right, and began to "follow the ridge." By-and-by an astounding appearance showed in the eastern mists—I stared amazed at the round sun! I had completely reversed my direction without knowing it. Turning back, I set off again, though with a feeling of uncertainty, both novel and unpleasant for those rocks. And this time I reached them. So far so good; but it was miles and miles yet to camp, and every mile full of actual or possible ridges, crags, pitches, precipices and—chiefly—enormous glaciers with their crevasses.

The next incident was the finding of *tracks*—made a day or two before, and still faintly visible. Naturally, I followed them like a sleuth, cherishing a reasonable hope of being led right into camp. How could I know the people who made them had also been lost? as I learned upon meeting them the next day. But after two or three hours, I lost faith in the tracks, and put in another hour or so tramping back and forth in an effort to reach a certain sound that came by gusts from the mist-encumbered space, and sounded like a waterfall near camp. But I always pitched up at the edge of an ice-cascade, or a precipice of rocks, or else a hollow of air, out of which it was obvious the sound did not come. Two ptärmigan loomed up in the fog—bigger, at first, than turkeys—astonishing me beyond measure. They were queer-acting birds, and evidently much more at home than I was.

While I made a long crossing at the brink of a steep declivity of the glacier surface, the night began to darken. Having nothing else to do, and persistently refusing to be tempted by easy ways into going lower than I believed the

camp to be, I still followed the sound of the phantom waterfall. Very likely it was, after all, only the roaring of the wind-blown forests in the gulfs below.

A small but serious crevasse slashed across my path; and I noticed that it was rather near when I discovered it. I took the hint, and camped on the very next rock-islet I came to. It was as big as a city door-yard, and tilted at about the angle of some in San Francisco. But it revealed absolutely nothing—cliff, cave or angle—in the way of shelter from the wind and rain. I forgot to mention the rain,¹ which had now been drizzling for some hours. Still, it was not extremely cold; the rain was of the Scotch-mist variety, and the wind, though it blew, did not rise to the violence of a gale. I put three stones as big as a water-pail in a row, chinked in their crannies a little, and lay down in the lee of them. There was just light enough to make out by the watch that it was half-past eight. It would be only six hours till daylight.

The minutes crawled by—ten, fifteen, twenty,—and the glow of exercise had died out of me, and I felt a chill a foretaste of what the night had in store—when a thrilling something swept by on the wind—something like a far-off shout. I could not believe it, yet sprang up and bawled lustily, and listened—no answer. Again I composed my bones to the stones of my bed, rested my head upon the canteen of ice-water, and shut my eyes—saying to myself that I had imagined it. But no! again I scrambled to my feet, certain this time that I had heard a chorused shout. Hard against the wind I bawled my answer, and flailed the rocks with the alpenstock. They heard me. Five minutes more and I slipped out on the snow to meet a search-party of nine hardy Mazamas, with ropes and lanterns, and a firm good-will to fetch me back to camp alive or dead.

It was merely the wildest freak of luck that they found me, for there was absolutely nothing to go by. I was surprised, and am still, that they tried it; because, by all the laws of probabilities, I ought to have been in the crater that night. I never dreamed of causing them any anxiety, unless I failed to appear by the next evening. But, as it turned out, it was very fortunate for me that they took another view of it.

As quickly as possible I accounted for myself, and stepped into Captain Skinner's restaurant tent, by the fire. One of the young women brought me—my blessing shall ever follow her!—a good drink of hot milk—better than barrels of whiskey. And that night I slept in a tent, under blankets, alongside of a hot camp-stove.

I felt no stiffness, except in my wrists, the next day, and walked down to Longmire's Springs with normal pleasure.

As to the best way to go up that mountain, I'm "of the same opinion still." That is, given reasonable weather and a climber in reasonable condition, and I still think that the least exhausting way would be to start as I did and make the summit at one march, reaching there about three in the afternoon. This would leave five hours, which is quite enough, of daylight in which to get back to camp. Moreover, it has several times been done in this way, and some experienced climbers up there also hold this view.

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

The Kaweah River and its neighboring ranges are attracting more and more attention from mountain lovers. In August of last year, a party made up of Messrs. Robert L. Hill, G. W. Hill and W. H. Perkins, of Tulare County, started from Eshorn Valley for a trip with pack-animals to the headwaters of the Kern River, and thence to Mt. Whitney. They proceeded in an easterly direction, crossing the north fork of Kaweah River, nearly due south of Baldy Mountain, then following the divide to the north of Dome Rock, where excellent camping-ground was found. From this place they followed the main cañon of the north fork of the Kaweah about three miles, thence crossing the Divide, traveled southwesterly along the government patrol route through the Sequoia National Park. Leaving this trail at Willow Meadow, they took a northeasterly course along the main Marble Fork of the Kaweah River, to a small meadow lying south of Mt. Silliman.

From this point easterly, good traveling was found along the north bluff of the Marble Fork to within three miles of its headwaters, where a small tributary from the north was ascended to the summit of the main dividing ridge. This divide was crossed about one mile north of Moose Lake, and followed until a perpendicular wall several hundred feet in height blocked the way. The extreme head of Buck Cañon was then entered, and the route pursued in a northeasterly course through a mass of boulders to a point four miles from the main Kaweah peaks. Here the animals were left, and a passage on foot attempted across the main western crest to the Kern River side.

The pass, however, which had seem practicable from a distance, was found, on nearer inspection, to be a part of the perpendicular wall partially surrounding the headwaters of a tributary of Roaring River. Here the Sierra Club seal was painted upon a large, smooth rock. As considerable work would have been required to make the pass feasible for animals, the party concluded to retrace their steps from this point.

It will thus be noticed that this party has ascended the Marble

Fork on its northern side, and traversed the table-land between the Marble Fork and Buck Cañon, passing across the head of that cañon to the Middle Kaweah.

The committee of the Sierra Club appointed for the purpose of securing headquarters for the Club in the Yosemite Valley, has performed its work most efficiently, as the following extracts from its report will show:—

YOSEMITE VALLEY, June 9, 1898.

To the President and Board of Directors of the Sierra Club:

GENTLEMEN:—We wish to report the following progress in connection with the Sierra Club headquarters in Yosemite Valley.

The agreement made with the Board of Yosemite Commissioners last fall, was that the building known as the Sinning Cottage be repaired by that Board for the use of the Sierra Club as a bureau of general information. The Club was to furnish the house, and keep there all its publications, maps and collections relating to the high Sierra. The salary of the attendant during the summer months was to be borne equally by the Club and the Board of Commissioners. In return for their share of the expense, the attendant was to assist the Guardian by directing campers to their grounds, and giving general information concerning the Valley to visitors during his absence.

Your committee wishes to state that the above agreements have been carried out. The Sinning Cottage contains two rooms, a large one in front, and a small one in the rear. The former contains a large extension-table for books, periodicals, newspapers, etc. On the walls hang framed photographs of the high Sierra, and all the maps in the possession of the Club covering that region. A large map of the Yosemite National Park, by Lieutenant Benson, U. S. A., has been loaned by Mr. Miles Wallace, Guardian. The small room is carpeted, and fitted up with a desk and chairs to be used as an office by the attendant. A cabinet will soon be constructed to accommodate the increasing collection of specimens, both botanical and geological.

The Club is to be congratulated upon securing the services of Mr. Wm. E. Colby as attendant, as he is so thoroughly familiar with the high Sierra and the cañons in the neighborhood of Yosemite.

It has been suggested by some members of the Board of Commissioners that the small dwelling-house adjoining the Sinning Cottage be fitted up by the Club for the use of its members. A number of sleeping apartments could be cheaply furnished, and a dark room constructed for use of members of the Club only. It would be well for the Board of Directors to confer with the Yosemite Commission upon this point as soon as possible, as in the opinion of your committee, such a club-house would be of the greatest value.

We wish further to state that arrangements have been made with Mr. George Kenney, proprietor of the livery stables, whereby members of the Sierra Club can obtain saddle and pack-animals for high mountain trips covering several days at the rate of one

dollar per day rental. This includes, of course, both riding and pack-saddle outfits.

The Club owes many thanks to the Board of Commissioners, especially to Mr. Abbott Kinney and Mr. Miles Wallace. Also to many of residents of the Valley who have contributed to the collections which have so far been secured, particularly to Mr. Galen Clark, and Mr. Charles B. Atkinson, members of the club.

Signed,

J. N. LE CONTE,
CHARLES A. BAILEY,
Committee.

NEGLECTED ROUTES UP MT. SHASTA.)

Within recent years the ascent of Mt. Shasta has been made so exclusively by way of Horse Camp and Thumb Rock, that it is often taken for granted that there is no other practicable route. It may be well, therefore, to remind our climbers that there are at least two other routes as good, and in some respects even better. Of the way up the long, sloping ridge to the east, between Mud Creek and Ash Creek, I cannot speak from personal experience, and I need only refer the reader to an interesting account of it by Mr. George S. Meredith, in the *Overland Monthly*, Second Series, Vol. 25, p. 451. Its chief advantages are its comparatively gentle slope, its freedom from snow until the summit is nearly reached, and the possibility of riding a large portion of the way. The distance of its starting point from the railroad is, no doubt, an item against it in the case of the ordinary tourist; but not so in the case of many who visit the region equipped to range more widely. And, furthermore, I understand that a new lumber railroad, built to reach the forests about the eastern base of Shasta, is now available to bring the mountaineer quite as near to the starting point for this climb as he would be to the other at Sisson.

Yet another route is the one somewhat slightly referred to by Mr. Meredith in his article as "an abandoned route by way of the crater." It is, indeed, abandoned; I have heard of no ascent by it since my own, on July 31, 1883. Yet, as compared with the regular "Sisson trail," which I had tried on a previous ascent, the advantages seem heavily on the side of the crater route. As important items in the account, I would name the more varied interest afforded by the crater itself, and the Whitney glacier, with the wonderful snow-grottoes at its head; the shortening of the climb by a thousand feet or more through the greater elevation of the night camp; the better footing — mostly on firm rock or on hard snow; the more even grade throughout; the escape from the insufferable heat and glare of the climb up a long snow-trough

directly facing the sun,—for here the snow-field may be traversed in shadow; and lastly, the escape from the falling stones which come thundering down the ravine as soon as the sun has thawed them from their perch on the crags at its head. A brief account of my own climb will, perhaps, serve better to indicate the route than a more formal set of directions.

Leaving Sisson in the afternoon, we followed the regular trail to within, perhaps, a mile and a half of Horse Camp. Here, as the trail skirts the base of the great southwestern buttress of the mountain—the buttress of which the crater is the culmination—we turned directly up the ridge, picking our way over rough lava ledges, passing the timber-line, and finally bivouacking on the open mountain-side at an elevation of perhaps 10,000 feet. The spot was near an emerald-green pool of water at the foot of a long S-shaped snowbank stretching up the ridge towards the crater. This snowbank is a constant feature of the mountain-side in summer, and by its shape and position can be readily picked out from Sisson. Its location is important, since no other water can be had within a long distance. Here my guide and I were joined by three young students, who were to make the climb with me on the morrow. The guide, in common with all of his kind at Sisson, had done his utmost to prevent me from taking this route; and his preposterous account of its dangers had convinced me that he knew nothing at all about it. I therefore arranged to leave him in camp with the horses. Though we were considerably above the limit of living timber, about us were scattered the withered remains of dwarf trees that had once grown here during some cycle of less rigorous seasons; and these furnished our camp-fire. The night was calm, and we did not suffer from cold.

Next morning I was up betimes, breakfasted, and was ready to start at twenty-five minutes past three, or just as soon as it was light enough to see where to place my feet. The young men could not be persuaded to leave their warm blankets—so my climb was made alone. Its first stage was right up the ridge to the crater-butte. Shortly before I reached its rim, a level bar of sunlight had kindled its crags into flame. After some little exploration of the crater, I resumed my climb, crossing by a saddle to the main mountain, and then up the easy slope of the Whitney glacier to the Black Hill. Half way up I encountered a crevasse stretching in a grand curve quite across the glacier. It was not too wide for an easy spring, were one quite sure of his foothold on the upper edge, and were one not quite alone. Fortunately, a sliver of ice was presently found to furnish the intermediate step, and the difficulty was quickly surmounted. I paused a few moments to explore and admire some wonderful snow-grottoes

formed by the settling of the snow-field away from the enormous drifts which comb over the ridge in southerly storms,—and again to enjoy my favorite exhilaration of rolling stones down the mountain-side. The smooth, hard slope of the snow-field was an incomparable track for such bowling, and my position enabled me to follow the huge stones until they actually vanished from sight in the distance.

Save for the brief time spent on the crater-butte, all the journey so far had been made in the shadow of the mountain. I now emerged into dazzling sunlight on the upper plateau, and saw the summit itself directly before me. A few minutes more and I was there—at a quarter past nine in the morning. I am not aware that the summit has ever been reached by another so early in the day; and my exceptional time I am disposed to ascribe chiefly to the excellence of the route. I entered my name duly in the record book; lunched most refreshingly on crackers and hot bouillon made from beef extract and cooked in my tin cup over the steam spring; rested, looked about me, and dreamed for two hours; and then started down again. It was not, however, by the route of my ascent, but along the plateau westward, then down one of the snow-chutes to the south, and so diagonally across the ravine to camp. It was then one o'clock P. M. Siesta and dinner, and the ride back to Sisson in the late afternoon completed a most memorable day. Were the thing to be done again, I would suggest but a single change in the program. I would send the horses around to meet me at Horse Camp, and would make the descent by the usual route via Thumb Rock and the southern ravine. The combination of a fine climb over firm rock and hard snow, with the exhilarating descent of some three miles by glissade, would be simply irresistible.

With reference to the possibility of seeing Mt. Shasta from points about the southern end of Lake Tahoe—a question touched upon by Professor Church in his article in the present number of the BULLETIN—it is well to remember that Shasta, Lassen and Mt. Rose are placed so nearly in a straight line as altogether to prevent, it would seem, any such possibility, even were the atmosphere perfectly transparent. Mt. Lassen, however, is persistently mistaken for Mt. Shasta all through the region from Diablo eastward to the Summit, and no amount of evidence seems able to dispel the error. On any clear day Mt. Lassen may be distinctly seen from Mt. Tallack, and doubtless also from Pyramid Peak and from Mt. Rose. And even when the air is too thick to permit the dark mass of the mountain itself to be seen, it may often be picked out by the flash from the long snow-field which fills the great ravine on its southern face. It looks

then like a straight white bar rising unsupported and a little aslant from the northern horizon.

In conclusion, let me refer all who may be interested in such matters to the valuable information regarding these two great Californian volcanoes—their history, their structure, and their most recent activity—found in the studies of J. S. Diller of the U. S. Geological Survey, particularly in the Annual Report of the Survey for 1886-87, Part I, p. 401; in *BULLETIN* of the Geological Survey, No. 79; and in an admirable monograph entitled: "Mt. Shasta, a Typical Volcano."

CORNELIUS B. BRADLEY.

The sketch map of the Kaweah Group prepared by Professor Dudley, which appeared in the last issue of the *BULLETIN*, was reduced one-half by the photographic copy. The scale, therefore, should have been given as four miles to the inch and not two miles as there stated.

FORESTRY NOTES.

Edited by PROFESSOR WILLIAM R. DUDLEY.

In the January (1896) number of the "Bulletin" a plea was made for the establishment of one or more wild parks among the coast redwoods—one north of San Francisco and one, if possible, in the Santa Cruz mountains. Whether the United States Government still owned any considerable amount of this timber-land was then a matter of uncertainty, but it has since been settled in the negative by the United States Forestry Commission. Hence the questions now are: Shall we favor such parks? can we secure them, and how? under whose control shall they be?

The problem is a different one from the preservation of the great forests of the national domain situated elsewhere. The latter question appeals to one because of its economic importance to the whole people. The motive underlying the segregation and preservation of portions of the original redwood forest is almost wholly one of sentiment, but it seems to me it ought to appeal to the whole people also. It is a sentiment not different in kind from that which bids us preserve the homes of the greatest citizens of our nation, and talk of their great and good deeds by our firesides.

All of the timber-land of value in the coast ranges is now in private hands, and we can foretell with sufficient exactness the time when the first growth of the redwoods will be entirely swept away; but we would save certain representative portions from such destruction, have them so husbanded and developed that many generations of our people shall be able to look upon primeval groves of the loftiest species of conifer our civilization has discovered.

We have been accustomed to consider the Sequoia of the Sierras as the greatest and most wonderful—indeed, one of the rarest conifers of the world. It was fortunate in having John Muir for a friend, and now it is the best-protected species of tree in the New World, the Sequoia and the General Grant National Parks being established with no other object than the preservation of this species. But the reasons which could be urged for the establishment of the Sequoia National Park could be pressed still more strongly in favor of the redwood national parks. The red-

woods are much more numerous, it is true, than the individuals of the sister species, but the former is more difficult to cultivate, not flourishing well outside the ocean fog-belt, while the big tree grows well in many climates, and is certain of becoming familiar to a much greater number of people. Sargent has found some of the redwoods considerably taller than any big trees that have been measured, and we may safely set down the former as the tallest coniferous species living. If one is rare and limited to the southern Sierras of California, the other is confined to the California coast ranges, no other portion of the globe producing any living specimens of either species. Lastly, Mr. Muir is as much in favor of the redwood parks as he was of the others.

The small grove of redwood giants at Felton, Santa Cruz County, has been visited by thousands whose only knowledge of the species is from such a visit. If this grove is sold it ought to pass into the hands of the railroad or the General Government, its safety being probably assured in either case. During the past two years I have gone over, with some care, the standing redwoods of the Pescadero, the Butano, Gazos and Big Basin regions of the Santa Cruz Mountains. One of these tracts is especially fitted by nature for a park, and the whole is quite unfit for any but forest growth.

Of the available tracts north of San Francisco I know less than other members of the club.

This movement needs money, for the reason that the nation has given away all of these valuable redwood lands, and if we desire to preserve a few hundred acres as an object lesson, we must apparently buy them back. The influence of the Sierra Club has heretofore been largely advisory, although we believe that influence has been widely felt. There is no reason to doubt that its success will be equally great if it addresses itself to this more arduous task. Why should we not, during the summer, gather all information possible on available tracts of coast forest, as well as possible contributors to a fund, and submit the same to the autumnal meeting of the society?

SECRETARY'S REPORT

FROM APRIL 30, 1897, TO APRIL 30, 1898.

One of the most important movements of the Club this year has been the establishment of Club Headquarters in Yosemite Valley, for the purpose of stimulating excursions to the high Sierra, and for furthering the work of the Club generally. A more detailed report of what has been accomplished in this matter will be found elsewhere in the BULLETIN.

Last October, through the kindness of the Appalachian Mountain Club, the Sierra Club exhibited the Sella collection of Alpine and Caucasian views. This collection is one of the finest of alpine views in existence, and it was much appreciated by those who saw it.

The session of the American Forestry Association, which was to have been held in Yosemite this summer, in which the Sierra Club was largely interested, has been postponed to a more favorable season.

The following have been made Honorary members of the Club: Prof. Joseph Le Conte, Prof. Charles S. Sargent, Prof. Wm. H. Brewer.

The following are the Directors and Officers elected for the ensuing year at the annual election on April 30, 1898:—

Mr. JOHN MUIR	<i>President.</i>
Mr. WARREN OLNEY	<i>Vice-President.</i>
Prof. C. B. BRADLEY	<i>Treasurer.</i>
Prof. W. R. DUDLEY	<i>Corresponding Secretary.</i>
Mr. ROBERT M. PRICE	<i>Recording Secretary.</i>
Prof. GEORGE DAVIDSON,	Pres. DAVID STARR JORDAN,
Prof. J. N. LE CONTE,	Mr. ELLIOTT McALLISTER,

and the following committees have been appointed:—

Auditing Committee.

Directors LE CONTE, DAVIDSON, McALLISTER.

Publications and Communications.

Mr. JOHN MUIR, Chairman.

Mr. WARREN GREGORY,	Prof. J. N. LE CONTE,
Mr. T. S. SOLOMONS,	Prof. C. B. BRADLEY,
Prof. J. M. STILLMAN,	Prof. W. R. DUDLEY,
Mr. HOWARD LONGLEY,	Mr. JAMES RUNCIE.

Admissions.

Directors OLNEY, DUDLEY, BRADLEY.

Parks and Reservations.

Pres. DAVID STARR JORDAN, Chairman.

Prof. GEORGE DAVIDSON,

Mr. T. P. LUKENS,

Mr. JAMES RUNCIE,

Mr. CHARLES A. BAILEY.

The total collected for dues for the year	\$619 62
Collected for Yosemite headquarters	48 00
Publications, etc., sold	15 85
Total	<u>\$683 47</u>
Cash deposited to account of Treasurer	\$660 65
Balance cash on hand	22 82
Total	<u>\$683 47</u>

ROBERT M. PRICE, *Secretary*.

TREASURER'S REPORT.

RECEIPTS.

Cash on hand, May 1, 1897	\$135 83
Received from Secretary	661 04
	<u>\$796 87</u>

EXPENDITURES.

Printing	\$316 62
Clerk hire	62 40
Rent	80 00
Janitor	12 00
Postage expressage	108 66
Stationery	17 05
Typewriting	2 00
Commission on collections	8 70
Taxes	2 10
Telegrams and telephones	80
Lantern service	10 00
Sella collection	86 95
Yosemite headquarters	40 00
Cash on hand	49 59
	<u>\$796 87</u>

H. SENGER, *Treasurer*.

PUBLICATIONS OF THE SIERRA CLUB

Number 18

SIERRA CLUB BULLETIN

Vol. II

No. 5



JANUARY, 1899

SAN FRANCISCO, CAL.

1899

SIERRA CLUB BULLETIN

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ancisco, California.



No. 301



MT. WHITNEY.

Drawn from the summit of Mt. Brewer, by Bolton Coit Brown, in 1895.

SIERRA CLUB BULLETIN.

VOL. II.

SAN FRANCISCO, JANUARY, 1899.

No. 5.

THE BASIN OF THE SOUTH FORK OF THE SAN JOAQUIN RIVER.

By J. N. LE CONTE.

That portion of the Sierra Nevada Range drained by the South Fork of the San Joaquin and the Middle Fork of King's River may well be called the heart of the High Sierra. Although the summit peaks do not rise to quite such an elevation as do some at the source of the Kern, still the mountains are so much more rugged, the cañons so much deeper and more numerous than in the southerly region, that the peculiarly savage type of High Sierra scenery seems to reach its culmination here.

Our information bearing on the San Joaquin Sierra is almost entirely due to Mr. Theo. S. Solomons, who visited the region during three summers, and explored nearly two-thirds of the great basin of the South Fork. His work, which is incorporated in the last edition of the Sierra Club map, is remarkably accurate, considering the extent of the country covered and the few instruments at his disposal. By referring to the map, it will be seen that the South Fork of the San Joaquin River heads at Mt. Goddard and flows north-west nearly parallel to the main crest for a distance of forty miles, where it joins with the Middle Fork, makes an abrupt turn to the west, and

flows through a deep transverse cañon to the California plain. This stream is fed by four main tributaries from the east. The first and largest is Mono Creek, which enters about twelve miles above the junction of the principal forks, and drains the crest from the Red Slate group to Mt. Abbott. The second, Bear Creek, joins the South Fork five miles above. Ten miles farther the North Branch enters through a very deep cañon and drains a vast area about the foot of Mt. Humphreys. And last is the Middle Branch, heading back to the Goddard Divide. South of this divide are the sources of the Middle Fork of King's River. This region is the roughest and most inaccessible in the whole range, and has not as yet been mapped, even in the most general way.

It was my good fortune last spring to be able to make arrangements with Mr. C. L. Cory for an extended trip through the upper San Joaquin country, with particular reference to the unmapped region about Mt. Humphreys. Our plan was to follow the South Fork to its source, making side excursions to the main crest by way of the large tributaries, and thus run a rough chain of triangulation between the highest peaks from Mt. Ritter to Mt. Whitney. If time permitted, we hoped to push across the King's River basin, and thus make that magnificent and wild cross-country trip from Yosemite to the King's River Cañon.

The start was made from Wawona, on June 16th. As we did not expect to be able to replenish our stock of provisions during the next six weeks, we took two pack-animals with us. We entered the mountains by the same route as that followed by Mr. Solomons,* namely, over the

* See Publications of the Sierra Club, Vol. I., p. 221. "A Search for a High Mountain Route from the Yosemite to the King's River Cañon." Theo. S. Solomons.

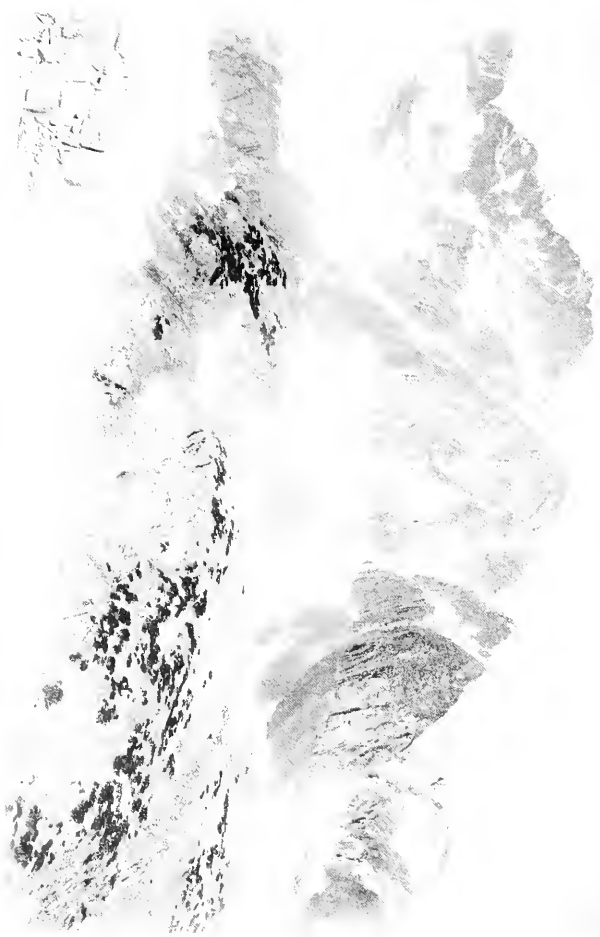
Mammoth Trail to the Jackass Meadows, across the Middle Fork of the San Joaquin at Miller's sheep-bridge, and thence by the Miller and Lux trail to its crossing at Mono Creek. The trail up to this point runs through the forest belt of the Middle Sierra, and it was covered without difficulty by noon of June 21st. Here we left the main trail and started up the creek to make our first acquaintance with the summits. Throughout its lower course Mono Creek flows through a wide, level valley covered with reddish sandy soil and a sparse growth of timber. Higher up it comes down through a magnificent cañon, whose walls rise to a height of 2,000 feet above the stream. The southern wall is especially fine, and at intervals side-gorges break through it, forming deep recesses, about whose heads are the snowy summits of the Abbott group, nearly 14,000 feet in elevation. A rough trail led up the left bank, and scarcity of feed for our animals drove us far up the cañon, nearly to the fourth recess, before we camped, at 7:30 P. M., at an elevation of 9,100 feet.

The Abbott group appeared the most inviting, but we wished, if possible, to get a station nearer Mt. Ritter; so we decided on Red Slate Peak for our first climb. By five the next morning we were off with camera, plane-table, and lunch, and took our way up the first stream entering Mono Creek from the north. After a couple of hours' steady climbing, we came in sight of a splendid jagged peak, which appeared to be the one we were seeking. In order to reach its base, we were obliged to climb out upon the main crest of the range at an elevation of 11,500 feet. From this point we saw that Red Slate Peak was far beyond, and that the nearer one was evidently that called Red-and-White Peak on the map. This latter, though not so high as Red Slate, is a far more imposing object; but it appeared to be entirely inaccessible from the south. So it

was without any great feelings of regret that we turned our attention to the more distant mountain. We were now forced to descend the eastern slope of the range for nearly 2,000 feet into a deep cañon, most of the way lying over hard-frozen snow-fields. Once at the bottom, it was an easy matter to skirt the southern spurs of Red-and-White Peak and make our way into a snow-filled cañon that led up to the Red Slate. We crossed long stretches of snow, around the margin of several frozen lakes, and at last reached the foot of the mountain and started up its southern flank. From this point the ascent is quite easy, although the jagged fragments of slate are even more trying to the patience than to the shoes. We reached the top by noon, after seven hours' steady climbing. There was no monument or sign of any sort to show that an ascent had ever been made before.

The view from the summit is one of the very finest that the High Sierra affords, and was the most truly Alpine we saw during the whole trip. Toward the north the crest retains its rugged character for a distance of ten miles only, beyond which it breaks down in the neighborhood of the Mammoth Pass. But to the south the mountains were piled up in indescribable confusion, over an unnamed and almost unknown wilderness. Rising above the sweeping snow-fields were a few giants of the range which we were able to recognize — Mt. Abbott and Mt. Gabb,* at the head of the Mono Creek recesses; the Seven Gables, on Bear Creek; still farther to the south, the spiry summit of Mt. Humphreys; and farthest of all, old Mt. Goddard, which lifted its head high above its neighbors. To the west was

* These two peaks were named by Prof. Wm. H. Brewer and party, of the California Geological Survey in 1864. On account, however, of the infinite way in which they were located upon the map of Central California, they have never since been, and probably never will be, identified. On the new Sierra Club map (1899) these names will be given to the two most prominent points in the immediate vicinity.



KILD-AND-WHITE PEAK.

From a photograph by J. N. Le Conte.



the great basin of Fish Creek, and close by the pinnacles of the Red-and-White group; while far to the north we could recognize our old friends of the Yosemite region — Lyell, Ritter, Dana, and Conness. By noon the sky was thickly overcast, and a cold wind made it very difficult to do any map-work; but by 1:30 P. M. we had succeeded fairly well and started down.

At five in the evening we reached camp, only to find to our dismay that one of our pack-animals was dead — probably poisoned by eating laurel. This accident cost us four days' delay, during which time we lived with a party of hospitable sheep-men till we could replace our jack, "Dewey," with a rare mule, "Dynamite."

The loss of time prevented an attempt at Mt. Abbott, so we started out again on June 27th, crossed the divide between Mono and Bear Creeks, and descended by a terribly rough route, and without a trail, into the cañon of the latter. Once in the bottom, there was no more trouble, and we made our way up the cañon to the foot of the Seven Gables, camping a second time at 9,100 feet. On the morning of the 29th, the Seven Gables was ascended. Though over 13,000 feet in elevation, the ascent is made without the slightest difficulty; in fact, we reached the top by 8:45 A. M. Now for the first time we obtained a clear view of Mt. Humphreys, about nine miles away in an air-line. One glance at it showed that its summit was difficult, if not impossible, of access. We could see that this mountain formed the culminating point of a long knife-edge on the main crest. The western side was a sheer precipice for certainly 1,000 feet; and with our knowledge of the eastern slopes of High Sierra peaks, we knew that that side was at least as bad, if not worse. So there was only one possible route to the summit, and that was along the knife-edge itself, although it was gashed down in many places by deep

clefts. Furthermore, the region to the west of it was one of peculiar ruggedness, and it seemed as though we could not get our animals within a day's march of the mountain from any direction. The day was a perfect one, and we remained on the summit for hours, gazing at the wonderful panorama. By four o'clock we started down, and returned to "Mosquito Camp" all too soon.

During the next two days we made our way back to Mono Creek, and again took the Miller and Lux trail up the South Fork of the San Joaquin to Lost Valley or the Blaney Meadows. This is a Yosemite-like valley about four miles below the junction of the North Branch and the South Fork, and here is located the main camp of the sheep-men, whose range extends over the whole region drained by the upper South Fork. At a fine hot spring we found the camp, and in the evening one of the pack-trains came in. From the packer we learned that the cañon of the North Branch was utterly impassable for animals, but that it might be possible to reach Mt. Humphreys by keeping on the high ridges to the north of the cañon. So, at noon of July 2d, we climbed 3,000 feet out of the South Fork Cañon, and camped at an elevation of 10,550 feet, just below the top of the ridge. A magnificent panorama was now spread out before us. We were in the angle between the tremendous cañons of the Main South Fork and the North Branch, each 3,000 feet deep. The former, in a perfect maze of tributary gorges, headed back to Mt. Goddard and the wilderness of peaks to the east of it. The latter was directly beneath us, but the bottom of the cañon could not be seen, as the summits of the northern wall rose so high as to be projected against the southern, which rose precipice upon precipice far above us into the region of snow. Farther up we could see the silvery thread of the stream. The whole course of the cañon could be followed to the point

where it forked into two almost equal branches encircling Mt. Humphreys. The last of the sunset rays shone upon this great mountain, rising like a golden spire out of the deep shadow. Even at a distance of ten miles its great height could be appreciated, for not a peak within a radius of eight miles even approached it in altitude.

It is needless to relate the experiences of the next two days, for they consisted of nothing more than a series of fruitless attempts to get eastward across a plateau scored with deep transverse cañons. So we returned to the hot-spring camp in despair, and decided to abandon the attempt of getting our pack-animals any nearer.

So, early on the morning of July 6th, we packed our knapsacks with food for three days, took a light feather quilt apiece, the plane-table, aneroid, and Sierra Club register-box, but left behind from force of necessity the camera. Thus equipped, we took our way up the South Fork cañon as far as the North Branch, crossed this latter on a log bridge, and started up its cañon. Any one who has traveled one of these great cañons without a trail will understand what the work of the next three hours was like. It was breaking through thick brush, climbing over or between huge boulders of the talus slope, or scaling rocky promontories which projected into the stream. By 10 A. M. we reached the forks of the river, and found the traveling easier as we took our way up the south tributary. Finally we climbed out of the cañon by its north side, and made our way over a desolate moraine-strewn plateau to the last storm-beaten tree, where we threw down our packs for a camp at an elevation of 11,000 feet, at the very foot of Mt. Humphreys.

It would be impossible to describe our feelings as we stood at last in the presence of this great mountain, so utterly different from any other in the Sierra. It stood

alone, a solitary pinnacle of rock, rising 3,000 feet above a wide, desolate plain. Not a tree nor a vestige of vegetation was in sight, nor was there even a trimming of snow to relieve its savageness of aspect. The western side appeared to be a sheer precipice for 1,500 feet. That the whole ridge was a knife-edge we could tell by the myriad of tiny fringing columns projected against the sky. On the north the rocks fell in a clear sweep 500 feet from the summit to the knife-edge, and in the other direction, after a gradual slope for a short distance, there was another break of 1,000 feet to the southern knife-edge. The eastern side we could not see, but there could be no doubt that it also was a precipice. At first there seemed to be no possible way of getting to the top. We sat for hours in silence, gazing at the mighty shaft, and as the sun sank behind us we watched the shadows creep amongst the crags. Then we became aware of a gorge up the southern wall, which the shadows threw into relief; but even with the aid of our telescope, it seemed a hopeless task to ascend it.

By five next morning we set out across the wilderness of old moraines toward the mountain. Soon the sun rose, but its warmth did not reach us, for the mountain cast its shadow far out over the plateau; but golden streamers of light crowned the summit like a glorious aureole. We reached the foot of the débris pile in a couple of hours. It was not over 500 feet high, and soon we were upon the rocky front. We made our way without great difficulty up a rugged gorge to the crest of the southern knife-edge, where the warm sunlight poured in through a cleft in the ragged wall. From here we could see the awful precipice on the eastern side, a granite wall 2,000 feet high, as smooth as the face of El Capitan. Our ridge rose in a vertical edge for hundreds of feet, offering not a single foot-

hold. So after basking a while in the sunshine, we made our way to the little gully which had been seen from below. This ran transversely up the western face, and our hopes rose when we approached it, as the way seemed clear for several hundred feet. But these hopes were of short duration, for we soon encountered steep slopes covered with clear ice, which could not be ascended without either rope or ice-ax. I think a climber, properly equipped, might easily pass this place; and perhaps early in the season, when the gorge is filled with snow, one might ascend by its aid. But whether this would eventually lead to the summit is by no means certain. The little gorge crossed the main ridge, and seemed to run out into nothing on the face of the great eastern precipice. After pushing even beyond what seemed safe, we descended to the foot of the western cliff, and cautiously worked our way around its base, thus finally gaining the top of the northern knife-edge at the point where the summit rises vertically above it. No one could possibly ascend the mountain from this side, and we could again see the eastern wall. So we climbed along the crest northerly to the top of a little pinnacle, and lay down in full view of the summit, which looked down upon and defied us. What would we not have given for our camera at that moment! If it had only been possible to bring away a photograph—a suggestion of that wonderful sight, that spire of granite over five hundred feet high, not two hundred feet wide where we stood, and whose sides continued on a thousand feet below! I have never felt so impressed, so utterly overpowered, by the presence of a great mountain as when standing amongst the crags of Mt. Humphreys looking up that smooth wall to its airy summit, and again down ten thousand feet into the depths of the Owen's Valley.

We built a monument where we stood and deposited

therein the Sierra Club register-box, which I trust will some day be taken on to the summit. The aneroid read 13,550 feet, and on careful comparison on return to camp of the height still remaining with that already covered, we judged that the mountain was a trifle over 14,000 feet.* This is probably very nearly correct, as Mt. Humphreys overtops everything north of the Palisades. The descent to the talus was slow but not difficult, and camp was reached by one o'clock. After lunch we shouldered our knapsacks and went down as far as the forks of the stream, camping for the night at the more reasonable elevation of 9,300 feet.

By ten o'clock next morning we returned to the hot spring. During the morning it rained hard, but cleared off in the night; and finding the weather fairly settled by noon, we started with our outfit up the cañon of the South Fork on July 8th. The trail was rather obscure, though not very rough, and the cañon was truly magnificent. The west side was a fine rocky wall for a distance of many miles, over which the tributaries from that direction plunged in a succession of cataracts. By evening our trail crossed the river, and we camped in a grassy flat on the further side, near the junction of the Middle Branch. This last large tributary enters between two bold, rocky buttresses, and forms a fall of considerable height. Its cañon looked inviting, but we had already wasted too much time in the North Branch country, and so pushed on up the main stream, reaching the base of Mt. Goddard by noon of the 10th.

* There is no doubt that the mountain we attempted is the true Mt. Humphreys. The location of the mountain as given by our triangulation from Mt. Ritter checks closely with that given by the California Geological Survey when their map of Central California is corrected for a slight error in longitude, and is within 250 yards of the position given by Capt. Wheeler in his "Surveys West of the 100th Meridian." There is no mountain of equal height nearer than Mt. Darwin, eight miles south. On our return to the hot spring, we learned that three different parties from Owen's Valley had attempted the ascent before, but had failed.

The South Fork of the San Joaquin heads in a wide, grassy valley, very much like the upper Tuolumne meadows, but hemmed in on both sides by snowy ranges of mountains. One can ride a horse without the slightest difficulty quite to the foot of Mt. Goddard; but there his journey must end, for there is no possible way of taking animals across the Goddard Divide, or, even if it could be crossed, of descending the rocky gorges leading down to the King's River below.

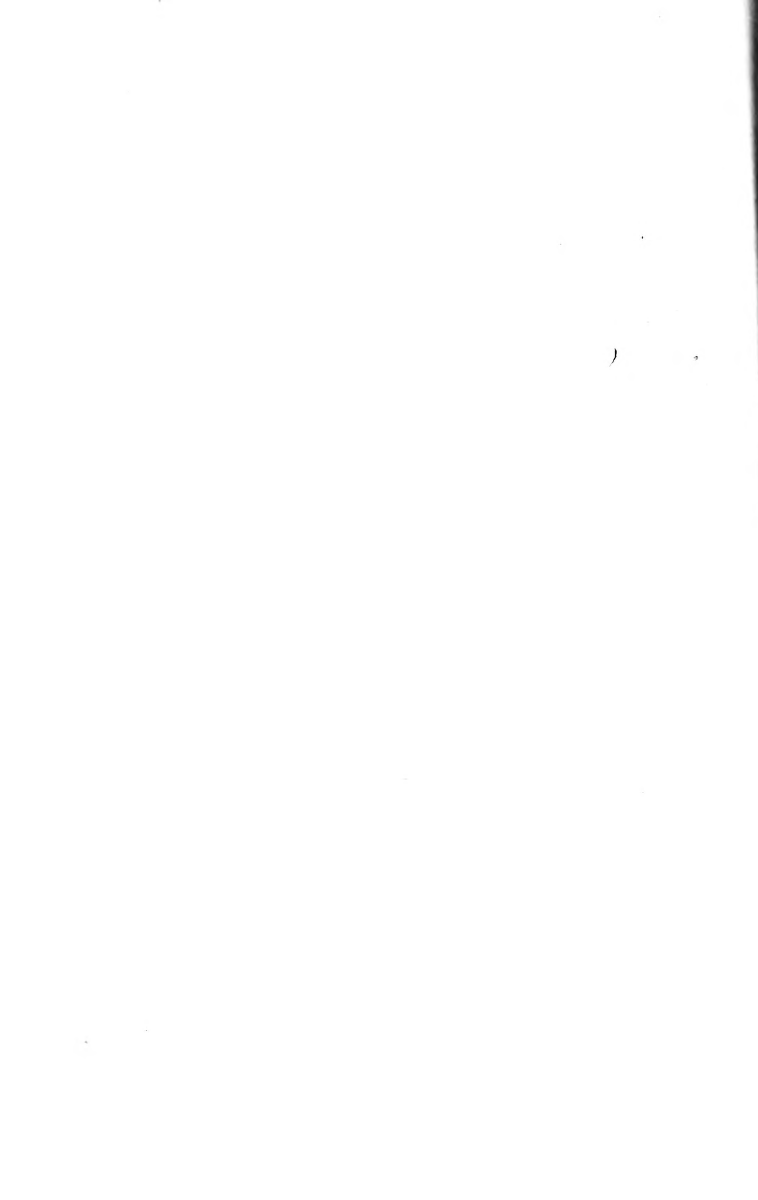
We camped near the timber-line and rested in the afternoon while watching the cirrus clouds drifting about. In the morning the whole sky was heavily overcast, but we had decided to wait no longer for this uncertain High Sierra weather, and so made our way across the intervening meadow-land to the foot of the mountain. The ascent of Mt. Goddard is accomplished without the least difficulty. It is very much such a climb as Mt. Dana affords, for the whole mountain is covered with loose fragments of slate. The view from the summit is unquestionably the most extensive to be found in the High Sierra. Every prominent point of the crest can be seen from Mt. Conness to Mt. Whitney, a distance of one hundred and twelve miles in an air-line. That portion of the crest from Mt. Humphreys to the Palisades is especially fine, all the higher peaks about the latter averaging over 14,000 feet. The upper tributaries of the King's River flow in deep parallel gorges, separated by high, jagged divides. The cañons of Goddard and Disappearing Creeks are amongst the deepest, descending over 8,000 feet in a comparatively few miles. The aneroid reading on Mt. Goddard was 13,500 feet.

From this point we could clearly see that our route to the south was blocked, unless we should abandon our outfit and proceed on foot. We had been told on several occasions of a certain Baird trail, which crossed from the San

Joaquin over to the North Fork of the King's at some point to the north-west of Goddard. From our elevated position we were sure we could see the point at which it crossed the high divide, and after some hesitation decided to make an attempt to follow it. So we took careful note of the intervening country, trying to impress on our memories the prominent landmarks, till, warned by the gathering thunderstorm, we were obliged to pack up our things and return to camp about noon. The following morning found us on the march by five o'clock. We retraced our steps a mile or so down the South Fork to the point where North Goddard Creek enters it. Here a wide bench runs diagonally up the west wall of the cañon, and, as we had hoped, we found the remnants of an old trail. This we followed carefully for nearly two miles; but in spite of all our efforts, we lost all trace of it in a wide meadow some thousand feet above the river cañon. We would not retreat, however, till every attempt to cross the divide had failed, and so decided to push on without a trail. The gap at the head of the meadow was evidently impassable. The next one to the north proved to be even worse; but after two or three hours' scrambling over the ridges to the south we finally came upon a pass to the north of Red Mountain that seemed a little better. I climbed to the crest of the divide to pick out a possible way, but found no sign of a trail, and the pass was fearfully rough. It seemed a great risk to take our animals up; but the great basin of the North Fork of King's River, dotted with lakes and meadows, looked so inviting that I marked out the best way with "monuments" and returned to the packs. My companion reported that a lower pass was to the south of Red Mountain, but as the one ahead was at least passable, we decided to try it. Every Sierra climber who departs from the beaten paths will understand what the experience of the



MONO GREEN CANYON
From a photograph by J. N. F. Smith.



next few hours was; so I will not describe the process of building trails across talus-slopes nor of boosting mules up steep slopes of sand. But we finally reached the top without serious accident, and, thinking our troubles over, tied our four-footed companions in misery to a couple of boulders, while we ascended Red Mountain to get a better view of the country to the south. But we little knew what was ahead; for the descent to the lake basin below was even worse than the climb. It was nearly three o'clock before we finally pulled up upon the shore of a little lake, after ten hours of the hardest work of our trip. We rested at the lake the remainder of the day, and next morning started across the basin of the North Fork of King's River. There was no trail, of course, and the route was very rough, but by the best sort of luck we made our way down into the cañon of the North Fork, and over another high divide to the headwaters of Crown Creek, which flows into the Middle Fork of King's River at Tehipite Valley. This stream was followed without difficulty, till late in the evening we ran across a well-marked trail.

There was no more trouble after this. On the morning of July 14th we followed the trail to Collins's Meadow, and from there descended into the Tehipite Valley. The wonders of this magnificent cañon have seldom been exaggerated. The only real exception seems to me to be in the estimated height of the great dome, which is certainly not over 3,000 feet, probably a little less,—far different from 5,200 feet, as sometimes claimed. In the cañon we found some campers, with whom we traveled for the next two days over that most villainous of trails up the river cañon to Simpson Meadow. Here we left them and took the Granite Basin trail over the great divide between the main forks of the King's River. From our camp in Copper Creek basin we made a last climb to the summit of Goat

Mountain, took a farewell view out over the glorious Alps through which we had been traveling, and on the afternoon of July 19th descended by the familiar Copper Creek trail to our old stamping-grounds of the King's River Cañon.

THE TAKING OF MT. BALFOUR.

BY CHARLES S. THOMPSON.

One hundred and eighty miles from the forty-ninth parallel, and due north of the boundary-line between Idaho and Montana, the Canadian Pacific Railway crosses the watershed that divides the Saskatchewan, flowing toward Hudson's Bay, from the Columbia, which empties into the Pacific. Howse Pass, the next possible crossing for a railway, is forty miles to the north-west. Between these passes there is an elongated, glacier-covered plateau, having its greater axis in a north-westerly and south-easterly direction, and forming the central of five parallel mountain ranges which here collectively form the Canadian Rockies. Among the numerous snow-covered peaks which rise from this central plateau, the highest, with possibly one exception, is Mt. Balfour.

We passed a leisurely Friday, the 13th of August, upon a bit of dry ground between river and marsh, about twelve miles from the railway up the Bow Valley. This valley, now under one name, now under another, as open meadow, as forest, as a wilderness of wash and boulders, extends in unbroken continuity to the head-waters of the Athabasca and the Arctic watershed. As the afternoon shadow of the precipitous escarpment which upholds the Balfour snow-fields drifted nearly to our tents, we made ready for departure. The packing of our selected outfit — a Ulumery tent, two blankets, some coffee, oatmeal, bread, and some boxes of sardines — detained us little, but the cross-

ing of the ford, hissing with the melted snow and ice of six hot days delayed us vexatiously. Then as we passed northward through a spruce forest toward the Lower Bow Lake our chosen pack-horse, a cunning brute, in an incautious moment of freedom, bolted through wood and ford back to his fellow-animals. So it was dusk or later, before we camped on a small open terrace in the ribbon of rising woodland that separates the western shore of the lake from the escarpment.

At daybreak we crawled reluctantly from our toy tent to an undesired breakfast of oatmeal porridge, bread and coffee. Then leaving Edwards, our packer, to take back our outfit to the ford, we turned almost immediately from the lake and struggled upward among thickly-growing trees, through a litter of underbrush and tangled logs. It was the most fatiguing hour of the day. Suddenly—for there is no warning vista—we came upon Lake Margaret, a sapphire-colored water hidden in a re-entrant curve of the escarpment. A semicircle of grey cliffs was reflected in it. To north and south these cliffs rose apparently in one clean rock-face from forest to sky-line. The central—that is to say, the western—wall was broken by two precipices so separated that of the upper only the fore-shortened summit appeared from where we stood. Diagonally across the lower precipice was the white line of a long waterfall.

We moved along the southern shore of this lake and crossing through the alder-bushes at its head,—though not without rending of garments—began our ascent at the foot of the northern cliffs not far from the central wall. A long, steep, narrow stone slope runs up to some broken ledges that in turn lead to impassable perpendicular rock. From below nothing seems more impossible. But just as we reached the foot of the perpendicular face, some semi-



LAKE MARGARET—LOOKING TOWARD THE WESTERN WALL.
From a photograph by C. S. Thompson.



LAKE MARGARET AND LOWER BOW LAKE—LOOKING
EASTWARD FROM THE PARADET.

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continuous shelves of rock enabled us, by careful combinations, to make a mid-air traverse between precipices to the parapet that divides the central wall.

In beauty of natural coloring few scenes can surpass that which we then viewed. Below us, the dark blue of Lake Margaret, forest girt, contrasted with the opalescent green of the Lower Bow Lake, and that in turn with the spruce-filled valley and the gray eastern mountains beyond. Before us a pulpit-shaped pinnacle of limestone, iron-stained, black and reddish brown, overshadowed a lake of rare hue, a liquid turquoise set in the basin terrace of the western wall. Over its farther shore, the drab and white of a dying glacier hid in part the weather-darkened face of the upper precipice.

We crossed the tedious stone slides that lined the basin and sat down upon the glacier near a rushing streamlet for a second meal. In mountain-climbing it is well to face difficulties with a filled stomach, and a critical problem now lay before us. At the head of the glacier a broad line, crooked but continuous, declared the presence of a *berg-schrund*, or great crevasse, a deep chasm separating the top of the glacier from the rock face. These *schrunds* can often be crossed by bridges of winter snow, wind-packed or avalanche-packed therein; but here the intense heat of the preceding week, stripping the glacier to gray ice, had almost entirely destroyed them. At one point far up its southern edge, a narrow veneer, preserved by the shadow of a neighboring turret, bridged the forbidding line in a disheartening manner. Nor did its appearance improve as we ascended. But at the pinch, strategy* prevailed and we

* As I have written, the glacier did not quite cover the second precipice. At the foot of the turret, a ravine, perhaps two hundred yards wide, made a cross section of both glacier and *schrund*. In the upper section of the *schrund* there was wedged some snow quite as soft and thin as the bridge upon the surface. But on so steep a slope, the angle at which our weight fell upon the snow was exceedingly favorable. It was the difference between breaking an egg by pressure upon its sides or upon both ends.

crossed, cautiously it is true, to the summit of the escarpment.

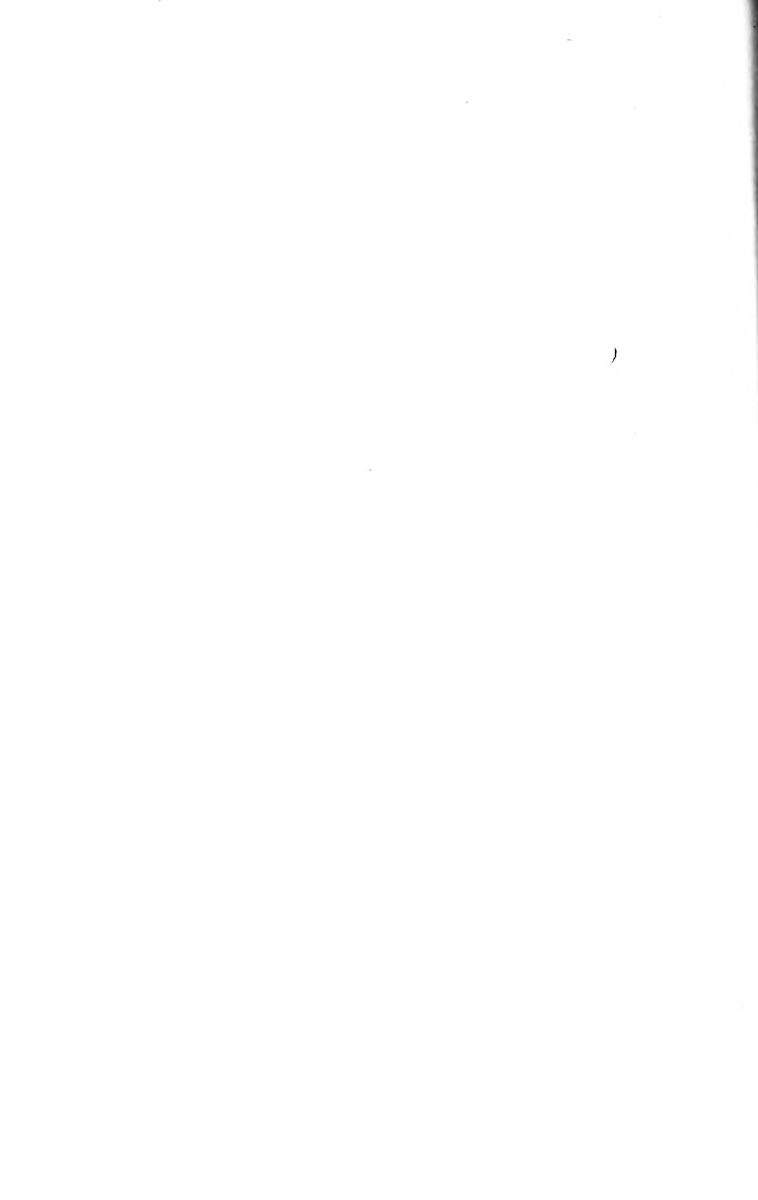
We entered a different world, a rolling Arctic plain dazzling in its brilliancy, sloping gradually from south to north. At the farther edge of this plain a palisade, partially ice-submerged, rose at first gradually, then suddenly into a beautiful snow peak completely glacier-clad. This was Mt. Balfour.

It was clear that we must somehow get upon the palisade,—that is, upon the southeastern ridge, or *arête*,—and follow it, come what might, to the summit. Three openings were possible. Between us and the mountain, following the foot of the palisade, the converging glaciers of peak and plain had worn a trench or moat filled with crevasse-shattered ice. From the moat two tongues of snow, suspiciously gashed, ran upward to notches in the *arête*. Neither route was attractive. Of the two the more northerly was longer, more distant, and more broken. The southern end of the palisade, surmounted by pinnacles grotesquely human, dropped its sky-line into a wave of snow. We determined to cross at this point in an attempt to gain the ridge from the other side. If the wave ended in a precipice, we could retreat down the trench to the shorter snow tongue.

We moved in a south-westerly direction, following the circumference of a circle whose center was Mt. Balfour. It was a pleasant, easy walk, at first over almost level ice, then over snow more and more inclined. The air was comfortably cool and clearer of smoky haze than on any day that week. The uncertainty gave the needed excitement. Near the top of the wave another *schrund* pushed us under the end of the palisade, then a sudden turn and we were upon the sharp-cut crest, looking westward into British Columbia. Fifty feet below, the snow changed into a



MT. BALFOUR.
From a photograph by C. S. Thompson.



rough macadam that in turn disappeared beneath another ice-field. A glance to the north quickly assured us that this western ice-field followed our chosen *arête*, rising indeed at a distance of two miles and a half almost to its level. Half a mile beyond that point was the summit of Mt. Balfour, no nearer than when we stood a long hour before on the edge of the escarpment, but presenting, so far as we could see, no insuperable difficulties. Hitherto we had been playing for position; now our course was straight away for the goal.

The journey over the western ice-field was uninteresting—a sloppy walk over slushy snow that rose and fell in long swales, over which Balfour's summit alternately rose and disappeared. At the top of the third swale we came unexpectedly upon the edge of a precipice, a south-western spur from the main crest forming with it a Λ -shaped angle, into which we were forced. At the apex of this angle we came again upon the watershed, this time upon our much-desired *arête* overlooking the ice-fields of Alberta and British Columbia. Beyond the angle there was a depression in the crest, where a soft stratum of rock had decayed into a stony clay, then a sudden uplift, almost a minor peak, followed by a second depression or saddle, from which there was a steady rise at an increasing angle to the summit. The view along this ridge was most impressive.

We had gained our desire only to abandon it. Once in the depression, we chose rather to traverse the western slope of the uplift with the certainty of success than to assault it along the *arête* with the uncertainty of a descent from it into the second saddle. Our traverse was slow, partly on account of the friability of the rocks, which had in places crumbled into a coarse sand, partly because of the instability of the larger fragments thereon. It was therefore with some relief, for our day ran short, that we drew

ourselves into a breach that admitted us to the second saddle, as cozy a lunching-place as we could desire. Even cold water was not lacking. So we opened a box of sardines and ate.

From this point onward the *arête* was half ledge, half ice, like a thin cake, heavily frosted, set on edge — a very thin cake and thick frosting; for where we sat in the saddle — and this width was rarely exceeded — the ridge was but twelve feet across and half that distance ice. The line between rock and ice was at all times abruptly and continuously defined. In our advance we kept near this mediate line, upon the ice along the easier gradients, upon the rock where the increased slope required step-cutting. Nothing hindered us, and at five minutes of three we were upon the summit, a circular platform of broken stones about twenty feet in diameter, and so level that it was impossible accurately to determine the highest point.

Time goes quickly upon a mountain-top; yet even with that knowledge, I cannot account for the rapid passing of that hour. There were the usual ceremonies consequent upon such an occasion — the building of a cairn, the reading of our aneroid (11,050 ft.), and the taking of various bearings with our prismatic compass. Then we lazily stretched ourselves upon the stones, as comfortably as possible, to enjoy the view. It was different from any summit vista I had seen — unique in its impressive isolation. Surrounded by miles of glacier-swept table-land, lifted by the distant escarpment high above the valley floors, the eye swept the horizon in vain for the green of growing vegetation. Everywhere ice and snow, cut by black lines of rock, the desolation of the frozen North. Across the gap which marked the valley of the Bow, I saw, gray in the haze, the prow-like summit of Mt. Hector. With that sight there came a vision of that day when I had stood thereon gazing with

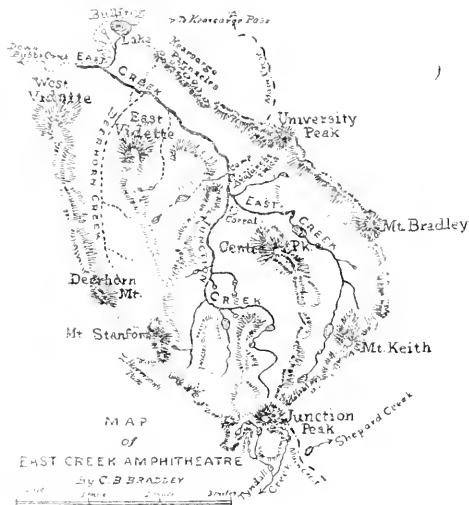
desire upon the mountain whereon I now sat. And with that vision came the words of one no longer with us, who then stood beside me: "The memory of the great snow-field, as we saw it from Mt. Hector, and of Mt. Balfour above all, is an abiding and haunting one." The taking of Mt. Balfour finished what he had planned. In success was much sorrow.

EXPLORATION OF THE EAST CREEK AMPHITHEATER.

BY CORNELIUS BEACH BRADLEY.

A visit to the Southern Sierra had long been a cherished wish of mine, postponed, however, of necessity year by year, until its fulfillment seemed almost hopeless. But at last all obstacles were removed by an invitation to join a party of friends making their first trip in that region — Mr. and Mrs. Robert M. Price, Miss Lalla Harris, and Mr. Joseph Shinn. Leaving Niles on the morning of June 25th, we reached Sanger the same afternoon, and Millwood, at the end of the wagon-road, on the next day. Here we found our "jacks" awaiting us, and next morning, the 27th, we began our actual tramp. Three short marches brought us to King's Cañon, where we spent two days. Eleven days were spent among the various branches of Bubb's Creek. On July 11th, we struggled over the King's and Kern Divide by way of Harrison's Pass, and four days later we stood on the summit of Mt. Whitney. From this point began our homeward journey, *via* the Hockett and Jordan trails; and on the 22d we once more struck a wagon-road on the Tule River, and our 200-mile tramp was ended.

Aside from the complete change and the quickening both of body and spirit, which are the prime motives of all such expeditions, we had proposed to ourselves three definite objects of effort: the exploration of the great amphitheater at the head of the eastern arm of Bubb's Creek, the ascent of Mt. Whitney, and a reconnaissance of the upper basin



of Roaring River by way of some pass in the neighborhood of Milestone Mountain. But our time was strictly limited — too limited, as it proved, for the execution of so extended a program and for much wayside pleasuring too. Our trip was therefore a strenuous one. On eight days only out of the twenty-seven, were we not actually packed up and on the march; and five out of the eight were spent, either by some or by all of the party, in climbing or in exploring, which was quite as arduous as the marching. To say nothing of Mt. Whitney, five of the great peaks of the amphitheater at the head of Bubb's Creek were climbed, — three of them for the first time, — and a sixth, also new, was almost conquered, when a blinding thunderstorm, with hail and rain, rendered further progress too hazardous to be thought of. We had, of course, the usual experiences with animals and packs, and the inevitable perplexities about directions and trails in a region where trails are, so to speak, conspicuously obscure or altogether absent. But, thanks to the excellent management of our leaders, and thanks to the excellent foresight of our commissariat, we escaped not merely all untoward and disabling accidents, but almost everything that could really be called hardship — Harrison's Pass alone excepted. We all came through — horse, foot, and dragoons — in prime condition.

After leaving the Cañon, our first attack was upon the unexplored eastern branch of Bubb's Creek, which, for convenience of designation, it is proposed to call East Creek. Its valley is really the continuation of the main Bubb's Creek valley beyond the confluence of its south fork, or South Creek, as Professor Brown suggests that it be called. Its lower portion, as far as the junction of Kearsarge Creek, is well known, being traversed by a trail to Bullfrog Lake, intersecting there the main Kearsarge trail *via* Lake Charlotte. But beyond Kearsarge Creek there is

no record of any exploration, save that of sheep-herders. We found it an open U-shaped valley, with an unbroken rock-wall on its northern side, forming at first the jagged ridge known as the Kearsarge Pinnacles, and further on sweeping up into the great peaks of the main divide, beginning with University Peak and ending with Mt. Keith. On the southern side there is no continuous wall, but instead, a series of bold promontories, the ends of long walls or buttresses running up into the King's and Kern Divide, some miles away to the south. Two of these promontories, standing guard, as it were, the one at the entrance to the valley and the other just within it, form a striking pair, and we named them the Videttes.* A third, standing more detached, and in the very center of the mighty cirque at the head of the valley, we named Center Peak.

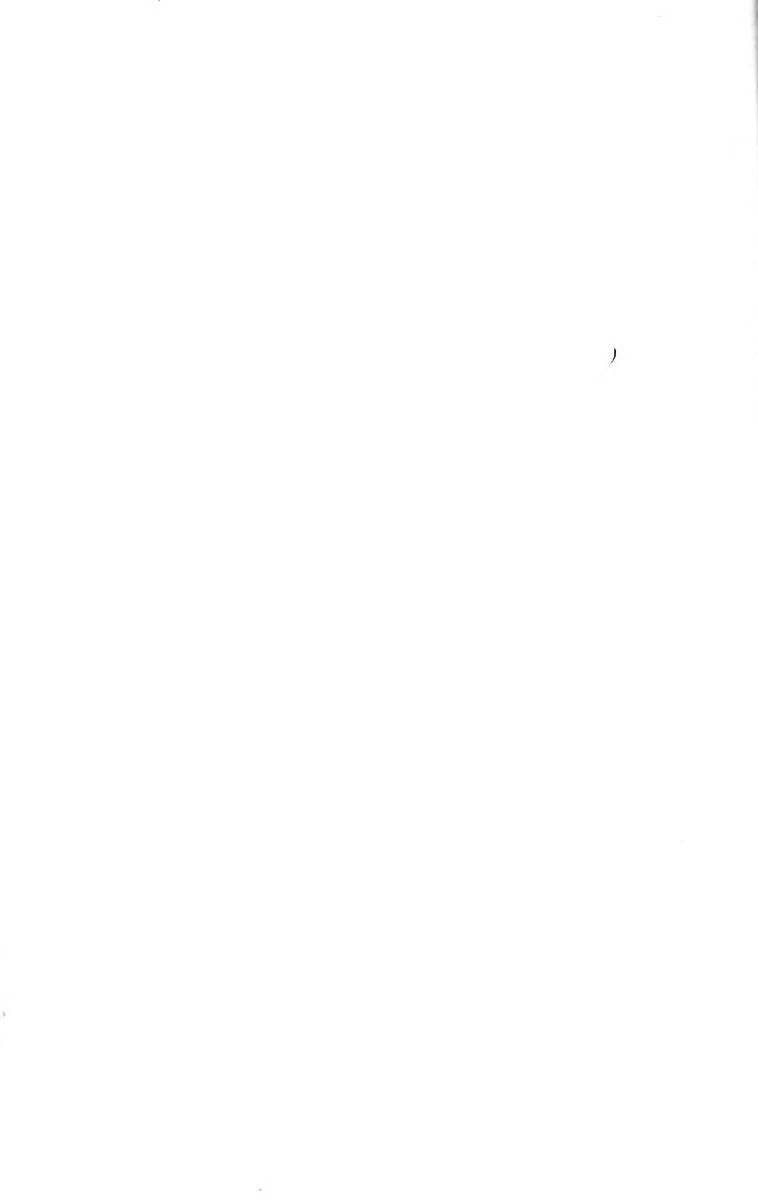
It was late in the afternoon of July 3d when we left the trail to Bullfrog Lake, and entered upon *terra incognita*. Finding good open country all along on the north side of the stream, we pushed on some two miles up the valley, and camped beside a bleak little meadow directly abreast of University Peak. Just beyond our camp was a great avalanche track, where some fifty or seventy-five years ago a great snow-field, breaking loose from its moorings far up on the slopes of the peak and plunging down the mountain-side, had swept quite across the valley and dashed part way up the slope on the other side. Its track was per-

* Both are finely shown in the view of Bullfrog Lake, Plate xiii. of the SIERRA CLUB BULLETIN, Vol. II., and reproduced in this number. The dark hill immediately beyond the lake on the left is the end of the Pinnacle ridge. The bold peak next to the right, but across the valley, is the East Vidette, seen end on, and to best advantage. In the extreme distance, above the center of the picture is Deerhorn Mountain, close up to the Kern Divide; and from it stretches down the long, thin ridge which ends near the right of the picture in the West Vidette, seen broadside on. Between the two runs Deerhorn Creek. The Pinnacles are shown in Plate xiii. of the BULLETIN, Vol. I., seen, of course, from the other — the northern — side. Their southern aspect, however, is very similar.



PIUTE LAKE.

From a photograph by E. N. Le Conte.



haps 600 yards wide, and as clean-cut as the swath of a scythe. Within it every tree was prostrated, and their rotting trunks—lying all one way on the open bottom, or heaped in a confused winrow at the very end, where the crest of the wave recoiled from the opposite slope—were eloquent witnesses to the terrific force of the avalanche. A similar track, but older and less conspicuous, we had passed perhaps a mile below. Both form striking gray bands across the valley, visible miles away from any commanding point of view.

Next morning reconnaissance was made in various directions; but a storm presently burst upon us, and the rest of the day we had to spend, for the most part, huddled together under such meager shelter as we could improvise. But the clouds broke away before sunset, and, thanks to the endless resources of the ladies, while everything was still dripping about us, we sat down to a Fourth-of-July dinner long to be remembered—with daintily cooked viands and abundant good cheer, as well as with appropriate toasts and speeches. We could not know for some three weeks yet what actually was doing at Santiago and elsewhere on that fateful Fourth, but the uncertainty only gave an added touch of pathos to the sentiments.

On the 5th we resumed our work of exploration. One of us was detailed to keep camp; three were to climb an unknown peak on the main crest, next beyond University Peak; while to me fell the easier task of climbing Center Peak and of mapping the stream which heads beyond it in Junction Peak. Both ascents were entirely successful; each party built a cairn and left therein a record of the ascent. But unfortunately I was not on hand to save the other party from the serious indiscretion of naming their peak Mt. Bradley. I protest that I had done nothing to deserve such treatment at their hands, nor had there been either

tacit consent or even contributory negligence on my part; for my views on the naming of mountains have been publicly and emphatically expressed. And, worst of all, there seems now no way to remedy the mischief, unless it be by making the ascent myself some time, and stealing the record!—a device which somehow did not occur to me at the moment.

Next day we all set out together to climb Mt. Keith, the peak next beyond the last, singled out and named some years ago, but never as yet ascended, so far as we could learn. After two hours of leisurely walk up the open valley we reached its foot, and two hours later we stood on its summit—the highest peak in all the Bubb's Creek circuit, with only Whitney, Shasta, and two or three others overtopping it in all California. The day was fine, and the view superb. All the nearer world seemed spread out like a map at our feet, while east, west, north, and south, as far as eye could reach, rolled a billowy sea of mountain peaks, streaked and tipped with snow-foam. A cairn was built, and in it was deposited one of our two Sierra Club register-boxes, with names, date, and record of this, the first ascent.

To climb Junction Peak was all that now remained to complete our conquest of this portion of the Sierra crest, and for that climb we had reserved our second register-box. But my reconnaissance of the day before, and the view still nearer at hand from the summit of Keith, had convinced us that it was not to be climbed by either of the faces in view from the north. Yet it might perhaps be climbed from the south after we had crossed the divide.

And a few days later two of us, pushing on from Harrison's Pass, did try it by way of the high quadrate mesa embraced between the arms of Tyndall Creek. But just at the farther end of the mesa, where it drops away to a splintered and crumbling knife-edge leading up to the main

peak, the thunderstorm to which reference has already been made burst upon us. So, after sheltering ourselves awhile among the rocks from the fury of the hail, we were content to clamber down again in safety, and tramp some miles in the rain to the appointed rendezvous with our friends. Meanwhile Mr. Price, remaining behind at the pass, had climbed Mt. Stanford, being the only person, so far as the record shows, to reach the cairn built by Professor Brown in 1896. All others had ventured no farther than Gregory's monument.

But to return to our camp on East Creek. Although our exploration of the valley was by no means complete, since it covered little more than the great amphitheater at its head, nevertheless it was felt that we must push on. Still University Peak was too temptingly near at hand to be left without a visit. So, while two of us broke camp and took the pack-train around by trail to Bullfrog Lake, the other three took the more direct route right over the peak, rejoining us in camp at about 6 P. M.

The rest of our trip may be more briefly dismissed. After crossing the King's and Kern Divide, it became evident that the time still remaining at our disposal would not suffice for the whole of our program. Either Mt. Whitney or Roaring River must be left out. A careful reconnaissance for some miles along the Kern River failed to reveal the promised trail or opening leading over into the Roaring River basin. We could not be sure that there was any practicable pass at all. So, considering that a bird in the hand is worth two in the bush, we decided on the Whitney trip. The return by the southern route was but the inevitable result of abandoning the Roaring River scheme.

In general, the country immediately south of the divide seemed to us much less beautiful and interesting than the Bubb's Creek basin. It was a region of vast spaces with

little in them; bleak sandy deserts, boggy moors without shrub or tree, dreary miles of moraines. Even the forests on the hillsides had a ghastly look; for the tiny, short needles of the Balfour pine cannot cover, or even soften, the nakedness of the ground. The reddish-brown trunks rise stark and stiff out of white granite rocks or sand. The Balfour pine itself, however, is a striking tree, with more variety of individual character and form, with more piquancy of carriage than almost any pine we had ever seen. Then there is a peculiarity of texture in much of the granite of this region, which causes it to weather in strange spiry and flamboyant forms, quite unlike the splintering into angular blocks along the Bubb's Creek crests. A striking example is seen in the fantastic conical spires which dot the northern roof-like slope of Mt. Tyndall. The top-most layer of all, however, as seen on the summit of Mt. Whitney, is a fine massive, enduring rock, split indeed by frost into immense blocks, but not crumbling into sand. And it is doubtless to this enduring quality of the rock that Mt. Whitney owes its pre-eminence.

The country grew more interesting again as we neared the Kern River; and from there on we were in a region populous with campers from the Inyo and San Joaquin Valleys. The upper—and larger—Kern Lake we found to be only a meadow, flooded not very long ago by a fall of rock which dammed up the river. The lake is an unsightly thing; dead trees are rotting in stagnant water, and the bed is fast filling up with silt. It will not be long before it is meadow again. On the Kern we had the only two adventures of the trip—the capture of our best fish, a five-pound river-trout, and the narrow escape of one of our party from the claws of an angry mother-bear.

The Tule River, which we struck below Nelson's (just off the southern edge of the Club map), was in its way one

of the most beautiful things we had seen. Though flowing through open foot-hill country clothed only with chaparral and scrub, the water was crystal-clear from its mountain springs, and the bed of the stream was of clean white granite rock *in situ*, sculptured into a succession of deep oblong pools; and over the smooth lip of each the water fell in charming cascades, or chutes, into the pool below — a string of emeralds on a silver chain.

Among the many things one would like to have done on such a trip, I may mention two or three which we should still wish to do were we ever again in that region. We should like to have another chance to climb Junction Peak, and to ascertain the truth about a reported pass in the second gap to the west of that peak. We should like to complete our map by exploring to their heads all the southern tributaries of East Creek, especially Deerhorn Creek. We should like to carry a few live trout from Bubb's Creek to plant in East Lake and Lake Reflection. And, more than all these, we should like to find ourselves with a fortnight to spare about the head-waters of Roaring River.

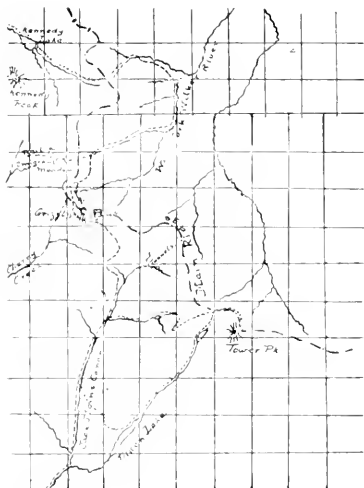
A NEGLECTED REGION OF THE SIERRA.

BY LINCOLN HUTCHINSON.

One day in September, 1896, with two companions, I stood on the summit of Mt. Tallac. When, after enjoying the beauty of the nearer panorama, we turned our attention to the more distant features of the landscape, we found ourselves particularly attracted by the peaks of the main ridge of the Sierra, which stretched off to the south-eastward from where we stood. The nearer peaks were bare and uninviting, but at a distance of forty or fifty miles was a section where the mountains seemed to have gathered up their forces for a mighty display. A confused mass of jagged peaks, blue and white in the distance, seemed to be beckoning us on to many an Alpine adventure. We then and there promised ourselves that some day we would seek a nearer acquaintance with those peaks.

About a year later, in August, 1897, the same party of three pushed southward from Tallac into the region of the Blue Lakes. A short side trip from Kit Carson Pass took us to the summit of Round Top in Alpine County, and from that point we again had a most charming view of the section which had so attracted us a year before. We found ourselves much nearer to those jagged white and blue peaks, yet still too far away to hope for an intimate acquaintance at that time. Again we turned homeward, carrying with us a determination that some time in the near future we would make our way into the heart of that rugged region.





Main Ridge — — — — —

Cur trail - - - - -

Scale 2 miles to an inch.

Upon our return to San Francisco, we set to work to learn as much as possible about the section we had seen and the best way to get to it. We could find, however, but little information, save of the vaguest sort. As one member of the Sierra Club expressed it to us, that portion of the mountains seemed to be pretty nearly *terra incognita* so far as the Club was concerned. Lieut. McClure's article on the cañons to the north of the Tuolumne River, in one of the Club BULLETINS, gave us the nearest approach to definite information which we were able to find. Unfortunately, however, his explorations did not carry him quite as far north as we wished to go.

As to maps we were more fortunate. Mr. J. N. Le Conte's map of a portion of the Sierra, published by the Club a few years ago, was of assistance to us as to the extreme southern edge of the section we wished to reach, but it, like Lieut. McClure's description of his explorations, did not reach far enough northward to give us all we wanted. But at the last moment, through the courtesy of the Secretary of the Club, we were enabled to get a photographic reproduction of the advance copy of the Dardanelles sheet of the U. S. Geological Survey's map. This, we found, covered our region and gave us invaluable assistance in determining our route.

As a result of our various investigations, we determined to make Sonora our starting-point, to follow the old Sonora-Mono toll-road till we reached the higher mountains, and then to be governed as to our further movements by what we saw and learned of the country before us. The result was a trip as fine as anything the whole Sierra can offer, and it is with the hope that the attention of all mountain-lovers in California, and of members of the Sierra Club in particular, may be drawn towards a much

neglected region, that I attempt to give an outline of our doings.

Our party consisted of five: Messrs. M. R. Dempster, A. G. Eells, C. A. Noble, J. S. Hutchinson, Jr., and myself. We set out on foot from Sonora on the forenoon of June 5th last, with three jacks, a camping outfit, and provisions for about three weeks.

It is unnecessary to give in detail the reasons which led us to follow just the particular route we took. Suffice it to say that our primary object throughout was to find scenery, and that we governed our movements accordingly, climbing prominent peaks here and there, in order to get general views which would enable us to pick out the most promising routes. It is a wild, rugged, lonely region, and we had to plan each day's march with the utmost care, yet on the whole we encountered very few really serious difficulties. We followed the Sonora-Mono road to a point about seven or eight miles west of the summit of Sonora Pass, then turned off to the south-eastward up the East Fork of Relief Creek, and made our way by good trail to Kennedy Lake, at the western end of Kennedy Pass. Kennedy (J. F. Kennedy, of Knight's Ferry), by the way, claims some two or three thousand acres of land in that immediate region and may raise exasperating objections to parties passing over his trails. To avoid delay, it might be well for any one planning such a trip to communicate with him beforehand.

From Kennedy Lake we crossed the main ridge, over the pass, to the head-waters of the Walker River. Then, following up the West Fork of that river, we made our way southward, in a general direction, crossed high passes, and finally succeeded in getting to the head-waters of Fall River, which flows a little west of south, through Jack Main's Cañon, into Lake Vernon and Hetch Hetchy. This portion

of our trip, from Kennedy Lake to the upper end of Jack Main's Cañon, was the only serious part, and it may be worth while to give our route somewhat in detail. In some places we were able to make use of existing trails, but often they were poorly marked, and it was only by constant reference to map and compass that we could follow them. Wherever practicable we improved the monumenting as we passed along. Over a considerable distance we were our own pioneers and here also, so far as time permitted us, we marked our route with monuments. Our exact course can best be shown by means of the accompanying sketch. By using this, in connection with the Dardanelles sheet (now published) of the map of the Geological Survey, future parties should be able to avoid any great delay or difficulty. It may be well to suggest a possible variation from our route. Instead of passing round Grizzly Peak over its western shoulder, it would probably be easier and shorter to go over its eastern shoulder. (This alternative route is indicated on the accompanying map thus: — - - - —.)

The greatest difficulty which threatened us was snow on the passes. We took our animals as high up as 10,200 feet, and if this had been a year of ordinary snowfall, we would certainly have found our way blocked at several points. As it was, we managed to get through by a process of dodging the worst places, and floundering through the others. Generally it would probably be best not to attempt the trip earlier than the last week of June or the first week of July.

Two short side trips are worthy of special mention. From a camp near the head of Jack Main's Cañon (a most beautiful cañon, by the way, and deserving of a more poetic name) two of our party made their way to the lake (known as Jack Main's Lake) in which Fall River has its rise. Close to the head of the cañon they found a curious natural phenomenon similar to one which Lieut. McClure

describes much lower down in the cañon—two tunnels, each two or three hundred feet in length, into which the river disappears, and through which it makes its way. The walls of these tunnels were composed in part of a beautifully crystallized substance which we have since found to be dolomite.

The other side trip was from the same camp in Jack Main's Cañon to Tower Peak, the highest point within easy reach of our route. The jacks were left in camp in the care of one of the party, while the other four of us set out with sleeping-bags and two days' provisions on our backs. There were no serious difficulties in the climb, and the view from the summit was inspiringly grand. The peak is not high as Sierra peaks go (only 11,704 feet), yet the panorama from its summit covers the whole sweep of the Sierra from Tallac to Lyell and beyond, a wilderness of massive peaks and dazzling snow with dark furrows of forested cañon slanting across. And that trip also brought us the never-to-be-forgotten memory of a night spent far up on a barren, exposed, precipitous ridge 11,000 feet above the sea, in a weird world of snow and ice and rock, silent and cold as death itself, and with the stars so near and so brilliant that they seemed within reach of our finger-tips.

Upon our return to Jack Main's Cañon we set out at once on our journey back to Sonora. Our route presented no special difficulties, being, for the greater part, over well-marked trails. We followed down the Fall River trail to Lake Vernon, turned westward to Lake Eleanor, and then made our way, *via* Lord's, back to the Sonora-Mono road at a point known as Long Barn. A large part of this return route is already familiar to members of the Sierra Club.

It has not been my purpose to give anything like a detailed account of our trip. As I stated at the outset, all



LOOKING SOUTH-EAST UP EAST FORK RELIEF CREEK TOWARD
KENNEDY LAKE AND PASS.

From a photograph by Lincoln Hutchinson



KENNEDY'S UPPER MEADOW — NEAR KENNEDY LAKE.

From a photograph by Lincoln Hutchinson.

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FOWER PEAK — FROM THE NORTH.
From a photograph by Lincoln Hutchinson



LAKE VERNON — FROM THE SOUTH WEST.
From a photograph by Lincoln Hutchinson



that I have wished to do is to call attention to the fact that one of the finest sections of the Sierra is being neglected. Some faint idea of the nature of the country may perhaps be given by the accompanying photographs, chosen more or less at random from among the many we took during our trip. It must not be forgotten, however, that photographs can give but the vaguest impression of the real beauty and grandeur of our mountains. Color and perspective are such vital factors in all such scenes.

To persons at all accustomed to mountaineering this region is easily accessible, and it is to be hoped that others may turn their attention in that direction. If any members of the Club, or others, care for more details in regard to the trip, the members of our party will be glad at any time to give such information as we have.

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

The office of the Sierra Club has been moved to Room 45, Merchants Exchange Building, San Francisco, where all the maps, photographs and other records of the Club now are.

There are but a few copies on file of No. 3, Vol. I., of the BULLETIN. The Club would like to purchase additional copies of that number, and we hope any member having extra copies will send them to the Secretary.

As suggested by Mr. Le Conte in his article in the present number, the height of Tehipite Dome has been variously estimated. Probably the most accurate measurements are those made by Walter A. Starr and A. L. Chickering in 1896. Mr. Starr writes that his aneroid barometer gave 4,055 feet as the altitude of the valley at the foot of the Dome, and 8,505 feet at the top of the Dome, thus showing a mean altitude above the valley of 4,450 feet.

He noticed, however, strange action on the part of the aneroid about the Dome—an abnormal jump in going from the backbone of the ridge to the summit, and believes that this peculiar phenomenon may be responsible for the wide variation of the aneroid measurements heretofore made. By a rough application of triangulation from the valley below the Dome, he reached a result of 4,250 feet, and, judging from these figures, together with other considerations, Mr. Starr arrives at the conclusion that 4,300 feet is a fair approximation of the true altitude.

Mr. Winchell of Fresno, one of the earliest explorers of Tehipite, gives the height of the Dome as 5,200 feet, obtained by a triangulation with surveyors' instruments.

NEW MAPS OF THE GEOLOGICAL SURVEY.

Since the last notice in the BULLETIN of the work of the U. S. Geological Survey in California, a number of new sheets have been published, notably the long-expected Yosemite and Dardanelles sheets. These two include between them one of the most interesting regions in the whole Sierra, from the head of the Mokelumne River on the north to Wawona on the south, and eastward far enough to include Little Yosemite, Mt. Hoffman, the Tuolumne Cañon, Tower Peak, and West Walker River.

The set of large-scale maps of the region about the Bay has been increased so that the list now comprises the following sheets: Karquinas, Mt. Diablo, Concord, San Francisco, Tamalpais, San Mateo, Palo Alto, San José, Mt. Hamilton.

There is a similar set of four maps of San Luis Obispo County — namely: Cayucos, San Luis Obispo, Port Harford, and Arroyo Grande; a set of twelve in the neighborhood of Los Angeles — Santa Monica, Pasadena, Pomona, Cucamonga, San Bernardino, Redondo, Downey, Anaheim, San Pedro, Las Bolsas, Santa Ana; and a detached group of three — Oceanside, Escondido, and El Cajon.

All these maps are sold at the uniform rate of five cents per sheet, retail, or at two cents per sheet for one hundred sheets or more, in one order. Prepayment is obligatory, and may be made by money-order, payable to the Director of the United States Geological Survey, or in cash — the exact amount. Checks and postage-stamps are not accepted. All correspondence should be addressed to THE DIRECTOR, U. S. GEOLOGICAL SURVEY, Washington, D. C.

C. B. BRADLEY.

A REVISED MAP OF THE HIGH SIERRA.

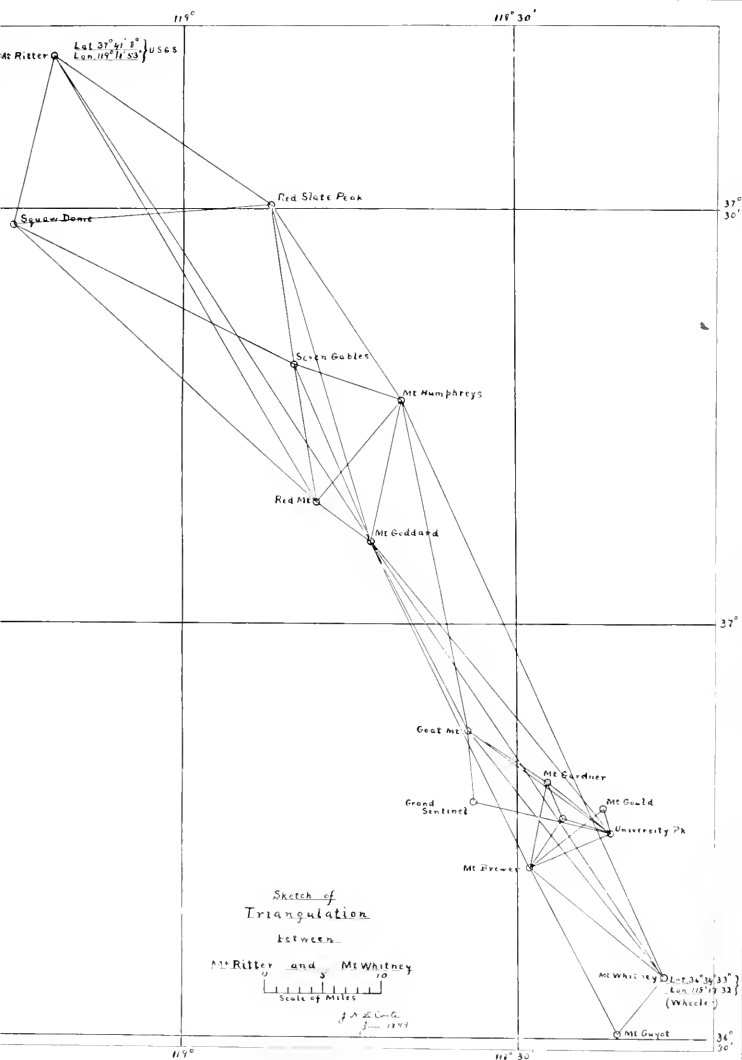
During the past summer, the writer and Mr. C. L. Cory succeeded in running a rough chain of triangulation, by means of a small plane-table, from Mt. Ritter along the crest to Mt. Goddard and Goat Mountain, thus connecting with the work previously done in 1895 and 1896 in the basin of Bubb's Creek and about Mt. Whitney. The accompanying sketch shows the relative positions of the principal peaks, all of which were occupied stations. From these fourteen stations nearly two hundred others were placed by intersections. The scale of the map was determined by the known positions of Mt. Ritter and Mt. Whitney — the first being given by the U. S. Geological Survey, and the last by Capt. Wheeler's Surveys West of the 100th Meridian. This material, besides a great

deal which has been accumulated by members of the Club during the past three years, I am now incorporating in a new edition of the Sierra Club Map. The map will be made in three sheets, and will be nearly double the scale of the old map of 1896. The northern sheet covers the region between lat. $38^{\circ} 30'$ and lat. $37^{\circ} 40'$, and between long. $120^{\circ} 30'$ and long. $119^{\circ} 00'$. This comprises most of the country drained by the Merced, Tuolumne, and Stanislaus Rivers. The second sheet covers from lat. $37^{\circ} 50'$ to lat. $36^{\circ} 57'$ and from long. $119^{\circ} 46'$ to long. $118^{\circ} 14'$. This is the San Joaquin sheet, though portions of the Merced and King's River basins are within its boundaries. The southern sheet extends from lat. $37^{\circ} 10'$ to lat. $36^{\circ} 10'$ and from long. $119^{\circ} 40'$ to long. $118^{\circ} 00'$, and is the King's-Kern sheet. The San Joaquin sheet is now complete, and it is hoped that the others will be ready before next summer. The Club will not be able to publish these maps at present, but blue-prints from the original tracings will be furnished to members at the cost of printing, which is fifty cents on paper and seventy-five cents on cloth, by addressing J. N. Le Conte, Berkeley, Cal.

The locations of the principal stations are as follows:—

<i>Name of Peak.</i>	<i>Latitude.</i>	<i>Longitude.</i>
<i>Mt. Ritter</i> . .	$37^{\circ} 41' 8''$	$119^{\circ} 11' 50''$ [<i>U. S. G. S.</i>].
<i>Squaw Dome</i> . .	$37^{\circ} 28' 50''$	$119^{\circ} 15' 45''$
<i>Red Slate Peak</i> .	$37^{\circ} 30' 20''$	$118^{\circ} 52' 00''$
<i>Seven Gables</i> .	$37^{\circ} 18' 30''$	$118^{\circ} 49' 55''$
<i>Mt. Humphreys</i> .	$37^{\circ} 16' 00''$	$118^{\circ} 40' 10''$
<i>Red Mountain</i> .	$37^{\circ} 9' 00''$	$118^{\circ} 48' 00''$
<i>Mt. Goddard</i> . .	$37^{\circ} 6' 00''$	$118^{\circ} 43' 05''$
<i>Goat Mountain</i> .	$36^{\circ} 52' 00''$	$118^{\circ} 34' 30''$
<i>Mt. Gardner</i> . .	$36^{\circ} 48' 15''$	$118^{\circ} 27' 40''$
<i>Grand Sentinel</i> .	$36^{\circ} 46' 50''$	$118^{\circ} 35' 00''$
<i>Mt. Gould</i> . . .	$36^{\circ} 46' 40''$	$118^{\circ} 22' 40''$
<i>Charlotte Peak</i> .	$36^{\circ} 46' 00''$	$118^{\circ} 26' 20''$
<i>University Peak</i> .	$36^{\circ} 44' 45''$	$118^{\circ} 21' 45''$
<i>Mt. Brewer</i> . . .	$36^{\circ} 42' 20''$	$118^{\circ} 29' 05''$
<i>Mt. Whitney</i> . .	$36^{\circ} 34' 33''$	$118^{\circ} 17' 32''$ [<i>Capt. Wheeler</i>].
<i>Mt. Guyot</i> . . .	$36^{\circ} 30' 40''$	$118^{\circ} 21' 40''$

J. N. LE CONTE.





PACK-ANIMALS, AND HOW TO PACK THEM.

In connection with the article entitled "A Neglected Region of the Sierra," printed in this number of the BULLETIN, the following notes may be of interest.

The party used packing-boxes constructed of the dimensions and in about the manner described by Mr. Howard Longley in the BULLETIN for January, 1897, except that instead of loops of rope passed through holes bored in the side of the box as there described, we slung our boxes by loops of leather fastened to the ends of the box. These loops were formed by cutting strips of the tough leather, called by the Mexican saddlers "latigo" leather, about an inch wide and sixteen inches long, and folding them with the ends together. A single screw and metal washer attached the loop thus formed to the end of the box at a point which brought the end of the loop just above the top of the box, and yet left it free to move backward and forward with the screw as the pivotal point. Loops of rope of the necessary length were passed through the leather and hung over the horns of the saddles.

In packing, we did not use the diamond hitch, but instead of it employed a hitch which is in common use among the Spanish packers in Southern California. For the kind of packs we had, and in such rough country as we passed through after leaving the Mono road until we reached Lake Vernon, it is, in the writer's opinion, much the better hitch. Although not difficult to tie, it is not easily described without the aid of diagrams; but the writer will take pleasure in explaining it fully to any reader who may desire to make use of it. In the foreground of the photograph of Kennedy's Upper Meadow one of our burros, with his pack on, is shown so plainly that it gives a very good idea of our method of packing.

The main purpose of this note, however, is to warn the inexperienced against placing too much reliance upon persons who may undertake to supply animals and packing equipments. All the pleasure of a summer's outing may thus be destroyed, even if no worse consequences follow. We had arranged to get three strong, reliable pack-animals, with complete rigs, at Sonora from Frank Hall, and to pay him \$12 for each animal and \$3 for each saddle, one-half of these amounts to be refunded to us on our returning the property in good condition. We arrived at Sonora about six P. M., expecting to find our animals and equipment ready, and to spend the long evening in adjusting things, so as to make an early start next morning. But Mr. Hall did not call at the hotel as we expected, and although we spent until eleven that night searching for him, we were unable to find him. When, none

too early next morning, we did find him at his house he showed us two of the smallest pack-jacks any of us had ever seen, and after difficult maneuvering to keep from being kicked, managed to corner and noose a third, a fractious, unmanageable brute, which we saw at once had never been used for packing, and refused to take. After another hour's delay, he secured from a neighbor a much larger and stronger animal, which, as we anticipated, proved to be the best of the three. One of the two little fellows began to limp the second day out.

But what most exasperated us was the makeshift saddles and junk-shop rigging which Mr. Hall provided for our use. The saddles were rudely made of soft pine, and the old paint showing in streaks led us to believe that even this material had already performed its more appropriate service as the prop and support of an aged, but honest, Sonora chicken-coop. The fittings certainly must have been part of the interior furniture thereof. Though with misgivings, we put them on our burros rather than be longer delayed. All of them required constant annoying readjustments and repairs, and one of them came to pieces one afternoon, as the result of its bearer lying down with his pack on, a frequent occurrence. Fortunately we were at the time near the old house at Baker's Station. Here we found some seasoned pine, and, with the aid of a hunting-knife having a good saw-blade and some copper wire which we had with us, we succeeded, whilst resting and sheltering ourselves from a passing afternoon thunderstorm, in making new front cross-pieces and so putting the thing together again that it was a better saddle than when we started. Almost every time we packed up we reminded each other that for \$5 apiece we could have gotten new ash saddles, well made and properly shaped with strong fittings, at a store on Market Street, in San Francisco, where we had priced them. This, in the slang phrase, "jarred us," and was provocative of profanity. Our state of mind when we were coolly charged \$2.50 extra for abrasions on the backs of the animals caused by the execrable things, can best be imagined. Moreover, we were told by other persons whom we met that we could have purchased outright plenty of well-trained pack-animals at \$7 and \$8 each in Sonora, if we had had the time and known where to look for them. It should be added that our outfitter did not appear to be an ill-natured or ill-disposed man, and that we know nothing against him except what is here set down. Doubtless, if he could have looked upon the matter in the light of modern business methods, knowing he had an organized body of patrons, whose wants it would pay to study and try to meet, he might have

proved a very acceptable caterer to such wants. As it was, we can hardly recommend him.

Our experience leads to the suggestion that the Sierra Club might easily be made the means of saving its members from such annoyance, impediment, and danger. The needful thing is to show an organized demand for the services of a painstaking outfitter at the two or three towns from which parties usually start out. If, for instance, those expecting to make a trip were to send to the headquarters of the club each spring a memorandum of their requirements, a committee could, with but little trouble, get some local agent (livery-stable man or other person) to give the matter his careful and business-like attention. Even if he took no pride in being, by special appointment, purveyor to her Majesty the Sierra Club, he would at least have the powerful incentive of profit. This would soon result in a business-like and adequate system. Especially so, if it could be supplemented by the personal efforts of any member of the Club, resident or temporarily present at the town in question. The mere privilege of storing from season to season pack-saddles and other equipment at some place in those towns, where it would be looked after by some one taking an interest in the Club's work, would be of great value. Even a simple registration at the office of the Club of the names of such outfitters as had been found satisfactory by parties dealing with them would be of great assistance to members contemplating that most satisfactory and profitable of summer recreations, a camping trip in the Sierras.

ALEX. G. EELLS.

FORESTRY NOTES.

Edited by Professor WILLIAM R. DUDLEY.

The stirring military events of the past year have happily not retarded a healthful development of the forest-reservation policy in the United States. It will be remembered that Congress suspended in June, 1897, eleven of the thirteen forest reservations established by President Cleveland, February 22, 1897. In 1898, through the efforts of the House (although again in face of opposition from the Senate), under the leadership of Representatives Lacey and McRae, backed by the best part of the press of the country, and the very active efforts of the American Forestry Association, the above eleven reservations were re-established, and again became subject to the operation of our reservation law. The work of the U. S. Geological Survey on the reservations was also continued.

Californians were favored by President McKinley's first forest-reservation proclamation, when he established, March 2 and June 29, 1898, the *Pine Mountain and Zaca Lake Forest Reserve*, chiefly in the so-called Ventura Mountains, north and north-east of Los Angeles and Santa Barbara, and comprising 1,644,594 acres. This reserve was made at the request of the people of California, particularly by the people of that region. Very little mountain forest land remains unreserved in Southern California.

Last spring the San Francisco Board of Trade appealed to the U. S. Government to establish a forest reserve about Lassen Butte, and very recently the State Board of Trade has passed resolutions inviting various organizations, including the Sierra Club, to co-operate in securing action by the Legislature favorable to efficient policing of forests of California (presumably those owned by private parties, are referred to). It also favors the establishment of a chair of forestry at one of the large universities. It is interesting to note that this State, from the beginning, has never wavered in its support of the reservation movement, and we owe many thanks to our Senators and Representatives in Congress for their sympathy with it.

The people of Arizona and New Mexico have shown favor to

reservation policy, and the Territorial Legislature of Arizona has petitioned Congress to reserve all mountain and forest land valuable for the protection of water-supplies, particularly for irrigation. Consequently, on the 10th of last May, the President established by proclamation the *Prescott Forest Reserve* in Central Arizona; on the 17th of August, the *San Francisco Mountain Forest Reserve* and the *Black Mesa Forest Reserve*,—aggregating 2,544,480 acres. In New Mexico 120,000 acres have been added, by Executive proclamation, to the Pecos River Forest Reserve. All of these reservations are of the greatest importance to the agricultural lands lying below them. It is gratifying to those familiar with the arbitrary lines of the forest reserves, to learn that the Black Hills Forest Reserve (Dakota) has been modified by the exclusion of about 190,000 acres, and the addition of 433,440 acres. This was no doubt done in accordance with the recommendations of the U. S. Geological Survey.

At the present time there is said to be 43,597,714 acres in the U. S. Forest Reserves; and more, particularly in California, will soon be added.

The increase of intelligence in America during the past two years, concerning our forest resources and sound theories of forestry, has been almost marvelous. It is no doubt due to the conscientious work and the recommendations of the U. S. Forestry Commission, combined with the bold generalship of President Cleveland in proclaiming such a large amount of forest land as reserved, that it precipitated a struggle between the enemies and the friends of rational forestry. Every newspaper in the land felt bound to look up and discuss the merits of the question and the interests concerned.

Traceable to the interest developed by the proclamation of February 22, 1897, is possibly the establishment, in 1898, of the first university school of forestry in our country, that at Cornell University. It is called the "New York State College of Forestry," and Dr. B. E. Fernow has been made director, with Filibert Roth as assistant professor. A four years' course of study and practice is laid out; but the greatest interest centers around the use by the school of a portion of the Adirondack State Reserve as experimental ground for working out a practical system of American forestry.

Conversation last summer with several of the trustees of Cornell University developed the fact that Dr. Fernow had already aroused in their minds the greatest interest in the undertaking; and he begins his work supported by their thorough good-will and active co-operation.

Returning to the Pacific Coast, near the end of August, the writer went immediately into the Sierras for ten days, to observe the effects of the excessively dry season on familiar forests, and the practical solution of the much-discussed proposition,—“Shall stock be allowed to freely range the forest reserves and national parks in dry seasons on account of the scarcity of pasturage below?” The answer appeared positive against unrestricted range, or even the usual amount of pasturage. For the high meadows and mountain river flats primarily suffered this year from shortage in irrigation, on account of the light snowfall last winter, just as the valleys below suffered from the light rainfall. Secondarily, they suffered to the absolute extinction (in many of them) of their perennial sod, from the hordes of animals which ranged and raged over them all summer long. They were unrestrained by the faithful cavalry of the U. S. regular army, who had “gone to Manila,” leaving the parks to their enemies during the year they needed protection most. It is impossible to enter into great detail. But the region was one I had visited before, after a season of plentiful rainfall, and high grass was abundant in the meadows all along the divide between the Kern River and the streams flowing westward. The bands of sheep were not then so numerous as to be forced from scarce pasturage elsewhere to attack the wet meadows. This year it was estimated that 200,000 sheep had swarmed over the divide through the Tule River region alone. From Nelson’s ranch—5,500 feet—I made four excursions to points mostly over 10,000 feet, one about 12,000 elevation. This should be the trackless forest, “where foot of man hath ne’er or rarely been,” but I found no space that had not been harrowed to dust by alien hoofs; the most difficult benches had been scaled, every plant or succulent leaf within reach had been devoured, and every meadow, wet or dry, gnawed to the quick. Not only sheep, but horses, milch cows, and even pigs, were frequently seen in the forests and on the meadows above 10,000 feet elevation. No one who has seen pasturing in a dry season, even in the most thickly-settled portions of the globe, can imagine the destruction these creatures had wrought in these, the wilds and fastnesses of our continent. Nelson and others reckoned that three-fourths of the “deer-brush”—a bush valuable for deer and browsing animals—had been destroyed, and that the White Meadows, a large series about the head of Nelson’s Fork of the Tule River, had been ruined, meaning that they would grow moss instead of grass the next rainy year. Half a dozen forest fires were raging in sight, as one stood on Jordan’s Peak, above the old Jordan Trail, the 5th of September.

Probably most of this destruction had been worked by the nomadic Portuguese and Frenchmen, who have no holdings in the mountains, and but few acres, if any at all, in the San Joaquin Valley. These men hurried into the mountains early the present year (1898); and when men who owned or had legitimately rented mountain meadows arrived later, they found their feed devoured, and sometimes the marauders holding the conquered territory with shot-guns.

There were a few forest "rangers"—1898 vintage—occasionally visible in September. Most of these men had been appointed by agents of the Interior Department, apparently for other reasons than their fitness. One was afraid of his horse; another was a village carpenter from the San Joaquin Valley, a good man, who had never been in the Sierras before; another never discovered any forest fires, excepting those near his own cabin, and these appeared to be mostly in his imagination. Earlier in the season these men had attempted to control the invading sheep-herders, but they did not arrive in the mountains until after the herders, when the latter ignored them with shot-guns; they therefore subsided into fire-extinguishers. Later, when the forest fires became more serious, men who knew the mountain trails, who knew and loved the mountains and could intelligently combat the fires, were taken on. Such men, to be had anywhere along the Sierras, are the men to form into the rank and file of a forestry service, and would be as clever in their place as the American soldier is in his.

Visiting the Sierras for four successive seasons has brought increasing conviction on one point: Our coming forestry service must be allied to the War Department or the Geological Survey, or some bureau similarly organized on the merit system of appointment, if it is to obtain respect from the public, or even from Congressmen. Our much-railed-at Congressmen, with all their faults, have not been slow to recognize and respect merit in scientific bureaus, when distinguished men were directors. Joseph Henry and Spencer F. Baird were generously supported. And it is a fact, perhaps scarcely known, that during the contest over the Cleveland reservations, compromise was finally effected, because the "Western Congressmen" were willing to yield their opposition if the whole matter of the reservations could be turned over to the Geological Survey to examine and report upon. This is something for the American Forestry Association to think on. The formation and guardianship of the forestry service is of vital importance. If it is a scientific bureau from top to bottom at the beginning, with an able director, Congress is likely to deal honorably with it ever afterward.







DEFILE IN THE ARAGUA SOUTH SLOPE OF THE CAUCASUS



MIDDLE REACHES OF THE TPEK, NORTH SLOPE OF THE CAUCASUS.

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Correspondence concerning the distribution and sale of the publications of the Club, and concerning its business generally, should be addressed to the Secretary of the Sierra Club, Merchants' Exchange Building, San Francisco, California.



NEAR SUMMIT OF ROCKY MOUNTAINS, WYOMING.
(Two burned over.)



TRACK OF TORRENT BELOW BURNED-OVER FOREST, SIERRA NEVADA

SIERRA CLUB BULLETIN.

VOL. II.

SAN FRANCISCO, JUNE, 1899.

NO. 6.

OBSERVATIONS ON THE DENUDATION OF VEGETATION—A SUGGESTED REMEDY FOR CALIFORNIA.

BY MARSDEN MANSON, C. E., PH. D.

When man, actuated by greed or ignorance, or a combination of the two, destroys the protection which nature spreads over rolling and mountain areas, he turns loose agencies which soon pass beyond his control. The protecting agent is vegetation, and whether in the form of forests, brush, or forage plants and grasses, the balance between it and denuding forces is easily tipped, when the inexorable law of gravity unchecked by myriad blades of grass, by leaves, roots, and vegetable mold, gullies the hillside, strips the mountain slope, converts the rivulet into the torrent, and causes the steady flow of the river to become alternately a devastating flood or a parched sand-bed. When once this balance has been destroyed, man cannot turn back the torrent and bid it flow once more a living and life-giving stream.

It would seem that this lesson had been learned so thoroughly by the human race that there would be little use to lay its precepts before a civilized community. But when one goes out over this fair land of ours and marks the rate at which its forests are being destroyed, its mountain forage areas devastated, he is tempted to regret that civiliza-

tion should be permitted to spread its blight over the temples in which the savage worshiped.

But it must be remembered that this destruction ceases in the judicious use of this wealth of forest and of mountain pasture, and that it is only indifference and incivism which permits greed and ignorance to go unrestrained until they destroy the balance,—that man has it within his power to utilize to its fullest measure this wealth and to pass it down to future generations as a blessing, rather than as a blight and a curse,—and that he can even aid nature by extending vegetation over barren areas. But this requires that the reckless destruction of forest, and the wasteful and continuous devastation of pasture should be replaced by systematic utilization of these sources of wealth.

A FEW INSTANCES OF THE EFFECTS OF DENUDATION.

In several ranges of mountains and over considerable portions of California the writer has had opportunities to observe the effects of denudation.

Probably no range of mountains has longer had civilized man around its base than the great Caucasus and its outliers. This range extends from the Straits of Kertch to the Caspian Sea, a distance of over nine hundred miles. The culminating peak, Mount Elbruz, rises some three thousand feet higher than the highest peaks in the United States, and the group is analagous to but greater in all respects than the Sierra Nevada. Its slopes drain either into the Caspian Sea or into the Black Sea and the Sea of Azov. The slope draining into the Black Sea is subject to summer rains, and therefore more readily recovers from denuding agencies. The southern slope is broader and gentler than the northern, which is subject to a drier climate, and sparsely covered with both deciduous and coniferous growths. At all points where these mountains were observed man has wrought ruin since the dawn of history. Every stream, every slope is marked



UPPER REGION OF THE TEREK AND NORTH SLOPE OF THE CAUCASUS.



LOWER PORTION OF THE ARANGUA—RIVER BED BURIED.

with destruction. The great historic route up the Tirek, through Darial Pass, and down the Gudoor and Arangua to the plains of Asia Minor, is everywhere seamed with the ruin which the unrestrained hand of man has put in force.

In passing along the main drainage lines, it is possible with a little experience to determine the comparative exposure of the tributary watersheds by the amounts of debris brought down. The appended photographs show the general appearance of the slopes and streams, the measures taken to restrain and divert the flow of debris from the roads, and to provide crossings where roads are buried and bridges swept out. Nothing which man can call to his aid can restore soil to these wasted slopes. Such is the penalty of unrestrained stripping of timber and forage plants.

In parts of Europe the destruction has been as great; the literature on this subject is both voluminous and accessible. Enormous efforts have been put forth by the European governments to check the destructive force of torrents born upon the denuded slopes of the great chains of mountains throughout the continent. In no instance have these efforts been adequate, although much has been accomplished. Of the deserts of Southern France, S. Baring-Gould writes that "One hundred years has sufficed to sweep every particle of soil from the Causses, which it took countless ages to accumulate; and land that once maintained a well-to-do population is reduced to a desert." *

The plateaux of Central Spain and the south slope of the Pyrenees afford the best comparisons with our conditions in California — the climate and rainfall being in general analogous to ours, and the poverty and desert-like conditions warn us as to our future, should our course of timber destruction and unrestrained pasturage continue. The descendants of the shepherds who devastated the fair land of Isabella

* *Deserts of Southern France.* Vol. I, p. 23.

are in many instances found at the same work in our mountain pastures, equally disregarding the laws of nature.

In the Rocky Mountains, the work of devastation has been inaugurated on a scale calculated to dwarf anything done in Europe. Forest fires, the crowding of vast herds of sheep, the ax of the lumberman, followed by the fires of the sheep-herder, have all been active agents in converting vast areas into deserts as barren as those of the Causses, the Atlas, or the Apennines. In portions of the Rocky Mountains trees spring up rapidly after the first forest fires. Even when these fires have been so fierce as to absolutely destroy every vestige of timber, a second forest springs up with remarkable promptness and vigor; but when this is destroyed the next attempt of natural forces to restore vegetation is slower, and not effective. The appended photograph shows the second year of absolute barrenness in the midst of summer. The areas had been twice swept by forest fires. The first, burning off the original timber; the second, following a few years later, killing the sapling firs and pines. Although two summers had elapsed, not a sprig of vegetation has started to clothe for the third time the naked rocky "backbone of our continent."

The Sierra Nevada has fared even worse. Around Lake Tahoe the timbered areas have been entirely swept off, with the exception of a few thousand acres around Tallac, and some at the north end, reserved by the owners for later use. The mountain sides around the Hot Springs, and nearly all of the moraines and flats around the south and east sides of the lake, have been denuded. These areas, bereft of timber, are now ready to be abandoned to the State, large tracts being for sale at fifty cents per acre. The railroads, which were constructed to carry logs to the lake, have been torn up, and the region, shorn of its wealth and beauty, has been partly burned over to give a few sprouts to hungry hordes of sheep.

On the forks of Carson River there are several townships from which every vestige of timber has been stripped, first for mine timbers and later for wood. Then the area was burned over to afford tender shoots for spring pasturage. To-day it is only in rare little patches that young conifers are beginning to gain a foothold, and fires destroy many of these plantations. On the east fork in 1896, after heavy summer showers, the water sluiced off the ashes and soil to such an extent that tons of trout were killed. After the torrent subsided one could drive a four-horse wagon along the banks and load it with the dead trout. It is doubtful whether the stream can be restocked until the denuded slopes shall be afforested.

It is only necessary to read the accounts given in the daily press to partly measure the destruction by forest fires. The writer has personally traced these through every mountain county in the State. Even of that area which has been sacredly set aside as the Yosemite Reservation, the threat was openly made by the maurading sheep-herders, who have devastated Spain and Portugal, that they "would burn the Government out," — referring to the cavalry sent up to prevent the illegal destruction of the vegetation protecting the head-waters of the Merced and Tuolumne. The overstocking of these mountain pastures is what is doing the greatest harm. The writer once asked an intelligent stockman how many sheep could be pastured on a given area in the Sierras, and he gave, as his opinion, that 8,000 sheep could be pastured thereon without injury,— that is, without destroying all seed of forage plants and grasses. But, upon naming over the owners and herds which he knew, there were 40,000 sheep accounted for in the area.

The photograph opposite was taken in the drainage basin of the Moquelumne. It shows the path of a so-called "cloudburst." This was nothing more than a heavy summer rain upon a burned-over district, concentrating rapidly

in the steep gulches, and finally scouring away timber, boulders, and earth. In traveling thousands of miles in various ranges of mountains, on three continents, the writer has never seen the track of a cloudburst in a timbered country—always in the barren ranges from which timber was either naturally absent or had been destroyed by human agency. The reasons for this are twofold: First—Heavy rainfall occurring in a well-timbered country is absorbed, even when the fall amounts to several inches in a short space of time. In a barren region this absorption does not take place; the rain rapidly collects in gulches, and forms, in some instances, a veritable wall of water, soil, gravel, and rocks, carrying everything before it.

Second—The layers of cold, dry air, and hot, moist air, can superimpose themselves in a treeless country in such a manner that when condensation is inaugurated it takes place with destructive violence. These conditions are modified, or even entirely prevented, by the effects of forests and vegetation; and hence those regions escape the most violent downpours. The rainfall in tropical regions is several times greater than any occurring upon the treeless regions subject to "cloudbursts," yet the destructive run-off from tropical forest areas does not occur, on account of the dense forests and undergrowth.

The Coast Range in Lake County presents some of the worst of the early stages of denudation. The herding of sheep has been so close and continuous, that the forage plants and grasses have nearly disappeared. Over large areas it is now difficult, if not impossible, to find a single specimen of a once abundant forage flora. Many acres of valley land are being washed away; the beds of streams are widening by cutting away alluvial deposits of past ages and leaving bars of cobbles and gravel in their stead. These evidences of rapid deterioration are characteristic of all the public and much of the private land in the county.

This is the price which has been paid for the reckless use of the wealth with which that county was endowed; and the little benefit gained has accrued, in many instances, to herders or owners of sheep who owned no part of the lands upon which the damage is being inflicted. This county has been abused to such an extent that it is doubtful whether all the wealth which has been made upon wool and mutton in the entire State since 1849 could restore this single county to its pristine condition. Nor is this state of affairs confined to Lake county,—it extends throughout the State. If unheeded for a generation more, it will not be within the power of the human race to stay the destructive forces which have thus been turned loose, and to restore to our mountains their reservoirs of wealth and of water. Yet, under systematic and intelligent control, these areas may still be made the sources of perennial and increasing wealth, and the reservoirs from which the mining and agricultural lands below may draw never-failing supplies of water.

In Santa Clara County the floods of Los Gatos Creek have measurably increased in destructiveness. In one of the richest portions of the valley more than one million dollars' worth of land has been recently destroyed. The photograph shows a portion of this destruction and the feeble efforts of the adjacent land-owners to stay the force of the torrential floods which, with increasing volumes, are eating away the alluvial lands, leaving in their stead the "bar-ranca" forms of Southern and Lower California.

In the lower reaches of the Santa Ana, many hundreds of acres of valuable soil are being buried under wastes of sand brought down from the burned-over sheep pastures of the mountain watershed. These instances could be multiplied almost indefinitely from every portion of the State. But the real damage has so far only commenced. The most appalling feature is the absolute indifference with which the

mass of the people and the law-makers of our country regard the ultimate consequences of the forces at work.

EFFECT OF VEGETATION IN STORING WATER.

But few give full credit and consideration to the effect which vegetation has in checking the rate of run-off and aiding in the storage of water. This effect is vital, both to the preservation of springs and streams and to artesian supply, and preserves and supplements artificial storage.

In a catchment area of five hundred acres to one acre of reservoir space below, each foot of depth of reservoir capacity is equaled by an effective storage capacity of soil of less than one fortieth of an inch, so that if by reason of covering the catchment area with vegetation, one fortieth of an inch of rainfall can be caught beneath the surface and let down slowly to dependent springs and streams, this fraction is the equivalent of an acre covered one foot deep; or one inch of moisture stored in the soil is equivalent to forty feet of water in the reservoir.

In many forests in California, it takes more than five inches of rainfall in the autumn to give an appreciable increase of run-off—showing that the forest has checked the rate of run-off to an extent more than 200 times greater than the figure above mentioned as being the equivalent of a foot of water in the reservoir.

The great difference in the storage capacity of a timbered and non-timbered area is plainly shown in the flood capacity of the channels draining each. In the northern coast counties, subject to an annual rainfall of from fifty to sixty inches, the flood channels are of far less capacity than those in the southern coast counties, upon which the annual rainfall is from one fourth to one fifth that in the northern mountain slopes. The run-off from the treeless areas occurs in a few hours—whilst that from the timbered areas is so slow that it is not accomplished in months.

In considering the problems connected with the storage and conservation of water, it is essential to take up that of the storage or sponge capacity of the soil and the means necessary to increase this. Whether reservoir space be available or not, this factor and its possible increase should not be neglected, for a reservoir supplied from a catchment area devoid of protecting vegetation is soon silted up.

To directly trace and determine the effect of an increased rate of run-off upon artesian supply is a difficult and obscure problem. But the broad results are clear. Whether the water seeps into and through permeable strata, or under the edges of impermeable clays along the upper reaches of the valley channels, the result is the same. If the catchment area be denuded of vegetation and soil, a decrease in artesian supply must follow. This is due to the shorter time in which the rainfall can seep into the water-bearing strata—the increased rate of run-off going to swell the volume and destructiveness of floods.

In order to bring these generalizations into practical bearing upon the problems which confront us in California, we will consider the areas set aside as forest reservations and remaining as public domain in California.

Forest reserves approximate 14,000 square miles, as follows:—

	ACRES
Stanislaus Forest Reserve	705,000
Yosemite Forest Reserve	1,009,680
Sierra Forest Reserve	4,079,360
Pine Mountain and Zaca Lake Forest Reserve	1,159,083
San Gabriel Forest Reserve	573,048
San Bernardino Forest Reserve	731,176
San Jacinto Forest Reserve	664,678
Trabuca Cañon Forest Reserve	49,760
Total	8,972,125*

In addition to this, 34,688,932 acres, 54,000 square

* Reports of Surveyor-General of California.

miles,—or about one third the area of the State,*—is yet public land. These two aggregate 68,000 square miles, much of which is classified as desert land, but even this is used many months of each year for pasturage; another large fraction is mountain or rolling land sparsely timbered or covered with brush interspersed with forage plants, which make it of great value for pasture.

The policy of the Government in the control of this vast area has been along one of two lines—absolute neglect or absolute exclusion. After long periods of neglect, spasmodic efforts at protection have been made by sending out a "special agent" from the "East," who generally knows but little of our forests and less of our climatic conditions. Sometimes his efforts have resulted in the institution of suits for "illegal cutting of timber." These have generally resulted in dismissal, or, in rare instances, in the rendering of a judgment amounting to a small percentage of the value of the timber stolen. In some instances, when active and real examinations into the illegal seizing of lands, cutting of timber, or other abuses, have been instituted, the agent has been "recalled."

These efforts have, therefore, never resulted in much good other than to check for a while the fraudulent acquisition of public land, or the stealing of timber therefrom. They have never been the result of a well-conceived and sustained effort to protect the public domain and to conserve the interests and wealth thereof.

In one or two of the reservations, the opposite policy of absolute exclusion has been spasmodically carried out; a force of cavalry has been sent up to patrol the reservations, and under the thorough discipline of army officers, trespassing sheep-herders have been arrested, their flocks scattered, and effective restraint inaugurated over a limited portion of the forest areas.

* Records in office of Surveyor-General.

Neither of these policies is wise. The first condemns itself; the second fails to utilize the vast wealth of forest and pasture which these lands are capable of yielding. It is doubtful whether any system of forest management controlled from Washington, and under an ever-changing political system, could be efficiently and wisely administered. There are great obstacles to be overcome in getting rational conception of the facts before Congress. Eastern members, and even our own, rarely have more than a general idea of the facts, and are adverse to any policy of "withdrawal of the public domain from market" as long as there is land of speculative value left.

Again, the climatic conditions of California differ widely from those of other portions of the United States, and present greater difficulties to forest cultivation by reason of the absence of summer rains. Our forest flora are unique in the world; hence forest management here must be essentially modified from that found advisable elsewhere. It would, therefore, require a local and unique treatment, special in its development, and entirely different from what we must expect from a government which has never undertaken the handling of forest areas in a wise and statesmanlike manner.

The valuable timbered areas have long since passed to the ownership of aggregations of capital or private parties. In the Coast Range, it sometimes happens that one million feet, board measure, of lumber stand upon a single acre; this, at a stumpage of \$2.50 per thousand feet, is worth \$2,500; yet it has been sold for \$2.50. The sugar-pine, redwood, fir, spruce, etc., of the Sierras, have been disposed of in the same way. This is not new in the history of this country. The white pine of Maine, the live-oaks of Florida, the vast pine forests of Michigan and Washington have received the same treatment, and to-day thousands of acres, despoiled of their wealth, their recuperative powers checked by destructive pasturage, and intentional or accidental fires,

are in one or the other stage of decrepitude. The owners of these lands are, in some instances, almost ready to return them to the State. When an attempt is made to check the evil of timber-land-grabbing, pressure is brought to bear on Congress by those who desire to exploit the public wealth, and the attempt is rendered abortive. The results of this system are glaringly set forth in the case of the live-oak forests of Florida. Shortly after Florida was purchased, large reservations of this valuable timber were made for the use of the Navy. Later contractors for furnishing this class of timber to the Navy supplied, at high prices, the timber stolen from these very reserves.*

Nevertheless, under the advice and spur of those interested in forestry, and who realize the evils of forest denudation, broad and important investigations have been made, thorough studies have been carried on, the benefits to follow from correcting the evils which are practiced are fully elucidated, and have been reiterated with convincing force before successive Congresses for the last quarter of a century or more; yet no broadly conceived policy to check forest fires, to stop depredations, nor to afforest barren areas has been put in force; nor has any considerable portion of the funds recovered from timber stolen from the public domain been used to afforest the same; neither is any part of the funds derived from the sale of timbered lands set apart for forest preservation. No broader studies have been made under any government than the advocates of forestry have issued from the Government Printing Office. That these studies have resulted in no practical result is proof of the view that Congress cannot directly manage practical forestry. It is possible that the limit of work which the General Government can do is reached when the examinations are made. It would be idle to cite greater affairs which the Government has successfully accomplished as proof that it

* George P. Marsh: *The Earth as Modified by Human Action*, p. 387, note.

could undertake systematic forestry, for in this the element of "politics" must be dealt with in its most effective form, and the only way to nullify it is to place forestry above and beyond the power of the "practical" politician.

No policy contaminated by political control can be enforced over the long periods of time necessary in successful forest management. There is now on trial in New York the experiment of putting forest preservation in the hands of the State, aided by the broadening influences of a college of forestry. It is probable that the results will be more favorable than any possible under the General Government, for the nearer these great interests are to the people, to the individual, the greater becomes the possibility of beneficial results. The State Government is, however, liable to the same error as is the General Government. The same evils attend both systems. The differences are those of degree only; with readiness of correcting mistakes and evils possibly in favor of State administration. The evils attendant upon State administration of these problems are indicated in the case of the swamp and overflowed lands granted to this State by the "Arkansas Act" of 1850, the history of which is replete with mismanagement and fraud. To insure the most efficient management and the eradication or correction of the present evils with their certain results, a further remove from political influence is necessary than is likely under either mode of control. To some conservative body, constitutionally stable and beyond the reach of political influence, must these vital interests be intrusted. The nearest to this ideal is the Board of Regents of our State University. To their hands is intrusted the more important duty of directing the higher education of the youth of our State, and to them may be intrusted the care of our forests, particularly since the care and extension of forests and the conservation of water afford some of the best means of practically teaching and enforcing the

broadest principles of economics. In the great problems of forest preservation and extension lie some of the grandest applications of science, particularly of that branch of science the object of which is "the utilization of the materials and forces of nature for the benefit of man." The student can find no more comprehensive problems than those connected with replacing and conserving the forests, for these problems vitally affect the ultimate development of every industry of our State, and, under our peculiar climatic conditions, will for the remotest future determine the metes and bounds of the civilization which we are striving to establish.

We have but to ask what has followed the devastation of the forests of Lebanon, of the Caucasus, of the Atlas, of the Apennines, and of the Pyrenees, to answer with certainty the question, what will follow the devastation of the forests of the Coast Range and of the Sierras. History and nature record no law more inflexible, no effect more certain, than that poverty and degradation follow upon the destruction of the mountain forests. Could this lesson be fully impressed upon our youth—upon the statesmen of the future—there is no effort they would not willingly put forth to check the destructive agencies now in force. The revenues which these public lands and reservations can, without damage, be made to yield can be made adequate to inaugurate systematic forestry without calling upon either state or national funds, except sufficient to start the work. It requires the uniting of all interests, and the execution of the plan upon broad lines for the benefit of the great commonwealth, the State of California.

THE REMEDY SUGGESTED FOR CALIFORNIA.

The writer, therefore, advocates that all forest reservations and public lands upon mountain slopes, within the borders of the State, be granted by Act of Congress to the University of California in trust; that the object of this



SHOWING PORTION OF DENUDED AREA IN LOS GATOS CREEK.
(One million dollars' worth of land destroyed.)

trust be: to protect, maintain, develop, and extend the water supply of these areas forever. For this purpose, that the Regents be empowered to lease, under proper control, the timber-cutting and pasturage privileges of these areas, and to use this fund:

1st. To protect the catchment areas.

2d. To maintain a college of practical forestry.

3d. To construct reservoirs at such points as may be necessary to the industries of the State, and dispose of the water for the benefit of the trust.

4th. To acquire mountain lands to be added to the catchment areas.

5th. To do all such things as may maintain wise systems of forest and water conservation and use.

Since the Government has sold the timbered areas, and permitted them to be stripped to the serious injury of our water supply, it may justly be claimed that the least restitution it can make is to set aside the remaining lands for the purpose of restoring and conserving this water supply.

The extent of income-bearing property which can be made available for forest preservation and storage of flood waters is far beyond the general idea. It has been shown that the public lands and reservations within the borders of the State of California are about 68,000 square miles. It would be difficult to determine the value of the pasturage and timber-cutting privileges of this area. The fact that it covers more than one third the area of the State, and that upon it a large portion of the stock raised in this and in the adjoining State of Nevada is annually pastured, is proof that it is of considerable moment. Although public domain, it is used for private purposes in a way that is surely accomplishing a ruin of which we have but an inadequate knowledge. An experienced stockman placed the value of the pasturage privileges of the Yosemite

Reservation at \$50,000 for the summer of 1898, and at more than half that sum for ordinary years.

Inyo and Mono counties draw a revenue of from \$3,000 to \$7,000 per year from a "sheep license" which they levy on itinerant herders who pasture sheep on the public land in those counties.

The Yosemite Reservation is about one forty-fifth (1-45) of the public land and forest reserve areas, and on the above valuations is estimated to be worth at least \$25,000 per year for pasturage alone. This probably measures a considerable fraction of the value of the entire area. If this fraction be placed at one tenth (1-10) the gross value of these privileges, it represents a revenue of a quarter of a million dollars per year, or four per cent income on \$6,250,000.

It must be borne in mind that this area is now being used by individuals in such a way as not only to devastate it, but to seriously damage the fertile valley lands below the mountain areas, and to threaten cities and farming communities with ever-increasing floods, with the resulting low-water stages of spring and summer. If this policy be continued it will reduce our State to the conditions now prevailing in corresponding latitudes in Spain, Italy, Northern Africa, and Asia Minor. The same forces, the same methods, which have stricken those countries with poverty and degradation are to-day being wantonly and recklessly put in force here. The people of those lands are even now finding congenial employment upon our mountain slopes and are inaugurating the same practices which have reduced the orchards, vineyards, and pastures of their forefathers to uninhabitable wastes.

Thus these vast areas are becoming more and more barren and less and less able to restrain floods, instead of being systematically improved with the ever-increasing revenues which they can be made to yield.

Mining and agricultural interests are now confronted with the necessity of organizing to secure State and Government aid to construct reservoirs, to store flood waters for use during the late summer and autumn, the increasing rate of run-off not leaving sufficient water in the streams to serve their needs. Even if these efforts were at once successful, the construction of reservoirs will not answer future needs. Without forest preservation, these reservoirs will fill up with sand, gravel, and cobble-stones. Thus these reservoirs, if built, will answer the needs of only the immediate future.

The only true solution of the question is to utilize the revenues which the pasturage and timber-cutting privileges of the public domain can be made to yield in protecting the watersheds from denudation and in conserving and storing the water supply; could these revenues be justly expended for this purpose, the areas would be ever-increasing in value and usefulness, and nothing need be asked from the State or from the Government save a sum sufficient to inaugurate the work. If any better, any broader, plan be offered, the writer will bend every energy to put it in force. There are, of course, interests now thriving on the free use of these areas which, for selfish reasons, will oppose any measure looking to staying the destruction by which they profit; yet, if our civilization is to stand—if this great commonwealth is to advance with the advancing ages, this devastation must cease; systematic and economic use of this wealth must take the place of the methods now in vogue. History and nature record no law more inflexible—no effect more certain—than that poverty and degradation follow upon the destruction of mountain forests.

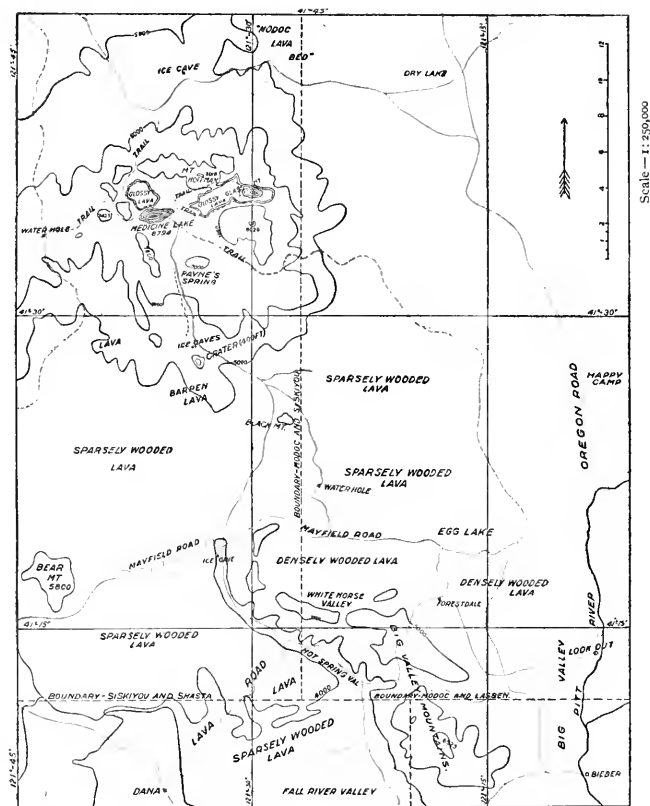
THE LAVA REGION OF NORTHERN CALIFORNIA.

By M. S. BAKER.

The Lava Region of Northern California is usually known as the "Modoc Lava-Beds," a name which is probably due to the prominence given a small area of the lava-beds in Modoc County at the time of the Modoc War. It is, however, a misnomer,—the greater area being in Siskiyou County, as shown by the accompanying map. Even the map shows only a small part of the vast lava-field which stretches westward to Mt. Shasta, northward through Oregon and Washington into British Columbia, and eastward into Nevada, Idaho, and Montana. According to Le Conte, this is one of the largest lava-fields in the world, covering an area of not less than 150,000 square miles, with an extreme observed thickness of 4,000 feet in the Columbia River Cañon.

In the regions I have visited, I know of but one deep cut into the underlying lava—the Pitt River Cañon in Shasta County, between Burney Valley and Fall River Valley. This is not shown on the map, but has probably been seen by some of the readers of the SIERRA BULLETIN, as the stage-road from Redding to Alturas passes along the bed of the cañon. A view of the right-hand cliff is shown in the photograph. This is a sheer precipice of about 700 feet, and is composed of almost countless layers of lava, each of them representing, apparently, a distinct lava flow. It, however, does not represent the entire depth at this point, as the river-bed is still lava.

Near the sky-line of the same photograph may be seen some scattered trees, which illustrate to some extent the



Scale—1:250,000

MAP OF THE LAVA REGION SURROUNDING MEDICINE LAKE, SISKIYOU CO.

(Lines in black mark 1000-ft. levels, traced roughly from "Modoc Lava Bed Sheet" of U. S. Geological Survey. Unbroken lines in red are wagon-roads, and broken red lines, trails. Many of these are from memory, and accurate only as to general direction.)

A

surface appearance of a portion of the lava region. Covered with fragments of basalt or lava, which has disintegrated into the more or less reddish soil peculiar to such regions, the surface is sparsely timbered with "Digger pine" (*Pinus Sabiniana*), dwarf oak, and a few species of shrubs. In the greater portion of the lava region, however, the disintegration has been more complete, resulting in a layer of a fine brick-red soil of varying depth, which not infrequently bears some of the finest forest growths of the Northern Sierra.

The cliff at the right of Burney Falls illustrates this point, though the soil there is only a few feet deep, and the forest, therefore, not of the best. The lava-layers may be seen again here, with jets of water spurting from the intervening cracks, producing beautiful cascades. Though these falls are scarcely one hundred feet in height, they possess a singular charm. In approaching them, one travels by a dusty road through a level stretch of forest, with no sign of water anywhere. To the left of the road is the bed of Burney Creek, which at the crossing, scarcely a half mile above the falls, is as dry as the road. Not a suggestion of the delightful scene ahead does the traveler receive, till suddenly to his ears comes the roaring of the water, and in a moment more there yawns a great chasm, curtained across by a sheet of lacelike foam, interwoven with masses of green. The hot, dusty traveler is charmed by the sight; he seems rooted to the spot, so loath is he to continue his journey. A moment after he takes to the road again,—the sound is gone, no river is visible, and the waterfall seems but a vision of delicious coolness and perfect loveliness.

The region representing the lava district is naturally divisible into three classes,—the densely-forested belts underlaid by lava, already referred to, the sparsely-timbered portions, as in the Pitt River region, and the barren lavas.

The second and third classes are familiarly known as "Lava-Beds," particularly the second class, as that is by far the most common. The only completely barren lava that I have seen is in the Medicine Lake region, and the only other I know of is to the north of Lassen Peak.

The forested and sparsely-timbered region of lava, however, covers most of the Northeastern Sierra between Mt. Lassen and Shasta, and to the north and east, in an almost unbroken field. Scattered patches and streams of lava have been found far to the south, especially in the Higher Sierra, where in many places the old cañons are filled with lava, which sometimes extends on the west almost to the valley floor.

An idea of the sparsely-timbered class of lavas may be obtained from the foreground of the picture showing "A Cypress of the Lava," though the surface is usually more broken. The many small, irregular cracks seen in this view are due to the cooling of the lava. In many places, in addition to these crevices, which are always quite small, depressions known as "pot-holes" occur, varying from a few feet to a hundred feet in diameter, and from a foot to twenty feet in depth. Their surfaces are far from smooth, appearing nearly as broken as the barren lava shown in the picture of Glass Mountain.

These pot-holes are supposed to be due to the formation of cavities during the cooling of the lava, and the subsequent falling in of their roofs. A crust soon forms on the molten mass, and in many places the lava underneath flows on, leaving cavities of varying sizes. The confusion caused by the falling in of the covers of these huge blisters is indescribable. As the lava becomes older, the holes fill up, and gradually the surface becomes covered with timber and more nearly level, till the entire surface is covered with soil, which bears a heavy forest.

The foreground of the photograph of the cinder-cone



BURNEY FALLS, SHASTA COUNTY.
From a photograph by M. S. Baker, July, 1898.



A CYPRESS OF THE LAVA, NORTHWESTERN SHASTA COUNTY
From a photograph by M. S. Baker, August, 1898

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(Medicine Lake) is another view of the barren lavas. A larger view of this barren region is obtained from the top of the cone. The cone is really a crater from which has flowed much, if not all, of the lava in the field. It is near the northern limit of the field, which slopes by a very steep incline to the south and west, a distance of six or seven miles, I judge, though I have not been over it. This flow I found of the greatest interest, since it represents, in miniature form, the characteristics of the larger and older flows, without their covering of soil and forest growth. Here is a small lava-field, with its crater, which was formed only as yesterday, and all in the compact area of perhaps ten square miles! There is scarcely a spear of grass, or any other vegetation, to be found upon its surface. It is a blackened region of desolation, awakening in the observer much the same sensation as does a vast fire-swept area; a desolation the more marked because of the green wall bounding it on all sides.

Except on the tops of the few peaks which escaped complete burial, there is nothing left of the forest that once covered the region. All else must have been swept down and completely hidden from sight. One of the green island peaks is shown in the view to the south of the crater. Something of the roughness and the incline of the lava is also indicated here.

Of the date of this eruption, I have little evidence, since the United States Geological Survey has not yet published a report of the region. But that it is comparatively recent is evidenced by the almost entire lack of vegetation, while the older lava surrounding it is quite densely covered in places with forest and underbrush. The island peaks, also, are doubtless composed of lava, or basalt, of a much earlier time. The view of the cinder-cone shows three or four pines in the foreground, while the cone itself has quite a sprinkling of forest growth,

due to the softer nature of its sides, much of it being pumice-stone.

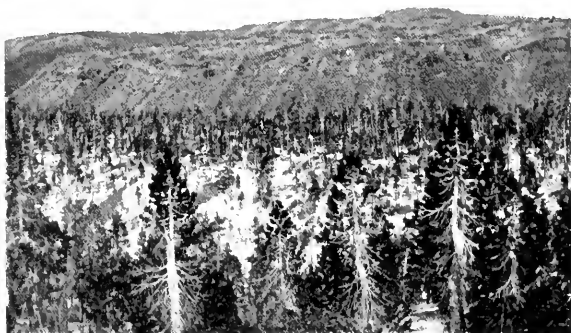
In all, I observed scarcely a dozen species of plants in crossing a stretch of perhaps a half mile of lava, and in climbing and exploring the crater. The pioneer plants which are the most efficient reclaimers of the barrenness appear to be two species of pine, the mountain pine (*Pinus monticola*) and the tamarack-pine (*Pinus Murrayana*). How these poor contorted dwarfs are able to live with their roots in the crevices of bare rock it is difficult to see. They illustrate something of the relative importance of atmosphere and soil to the life of the trees. Notwithstanding their scrubbiness, however, I saw many cones lying about. The trees in the foreground of the crater are mountain pines. The appearance of the tamarack-pine in a similar region about Glass Mountain is shown in the photograph of the mountain from a distance. The growth seen here is exclusively tamarack, growing in the pumice that fills up the depressions in the lava.

Mr. J. S. Diller, of the Geological Survey, has made a study of a very similar lava flow of recent date in the vicinity of Lassen Peak. It is probably even more recent than the one I speak of, for the charred trunks of some of the trees killed by the flow are still standing *in situ*. Many of the trees on the cinder-cone of the Medicine Lake lava must be at least three or four hundred years old. A complete exploration of this field would be of great interest in illustrating how the older lavas were formed, and in determining the extent and age of this one.

At a distance of about ten miles to the north of the cinder-cone is the Medicine Lake region, celebrated locally for its game, for a mountain of pure volcanic glass, and for a beautiful sheet of clear, pure water. The lake is approximately two miles in length by one in width. It has no outlet, and scarcely any water supply save from the melting of



MEDICINE LAKE -- FROM THE BLUFF AT THE SOUTHWEST.
From a photograph by M. S. Baker, August, 1898.



GLASS MOUNTAIN -- FROM A DISTANCE.
From a photograph by M. S. Baker, August, 1898.



the snow. Yet, in the driest years, I have never known the lake to be contracted much under the dimensions given. The appearance of the lake from a bluff to the south-west is shown in an accompanying photograph. In the distance may be seen Mt. Hoffman, one of the highest peaks of the region (8,018 feet). At the extreme right of the view is a small elevation; this is Glass Mountain, four or five miles to the east. This mountain, if such it may be called, is only 600 feet above the surrounding country at its highest point, while most of its surface is but 200 to 400 feet high. Though not remarkable in height, it certainly is in character. By an examination of the map, it will be seen that a flat-topped area of some five miles, by a mile and a half in extent, is marked off to the east of the lake by the 7,000-foot contour line. Just inside this line the 200-foot level is drawn as close as possible to the 7,000-foot line, representing a cliff of 200 feet. The whole inclosed area is made up of the roughest lava imaginable, sparsely timbered by the pines already mentioned, which are shown in the foreground of the view of Glass Mountain.

All the lava in this area is of a glassy nature; but no pure obsidian was seen till I reached the base of the mountain, where it may be picked up in abundance. Large boulders of it, of much the same color as flint, lay about, and the side of the cliff glistened with the broken fragments. On the eastern side of the mountain, I am told, the glass is not wholly black, but beautifully banded with a brick-red. Most of it seemed to come from a layer below the top surface, as I found scarcely any on the top, though all of the lava was glassy. The banded appearance of the broken surfaces showing the flow may be seen in many of the fragments.

A more rugged, topsy-turvy pile of rocks than the top of Glass Mountain can scarcely be conceived. I tied my

horse at the base of the cliff, with the intention of going to the top, but before I proceeded far, it became evident that I must give it up, or come back barefooted, so severe is the glassy lava upon shoe-leather. As it was, it required the most of one afternoon for repairs.

Another area of glassy lava, directly north of the lake, and similar to the area upon which Glass Mountain rests, is represented on the map by double contour lines 200 feet apart. Neither of these areas appears to be a flow, as neither is connected with a higher level, yet I could find no sign of a crater.

Two other objects of interest to our party were the beautiful trees of hemlock-spruce, growing on the peaks to the west of the lake, and the fine view of Mt. Shasta from the top of these peaks. The mountain is about thirty miles to the southwest, but even at that distance appears immense, on account of the altitude of the observer, and also because Shastina is hidden behind the main peak, giving the appearance of greater height because of the narrowed base.

One other feature of the lava region must be mentioned—the ice-caves. There are several of these known, and very likely many more remain undiscovered. Those located along the edge of the lava, near the cinder-cone, I have known to contain ice and water as late as August. The largest I have seen is on the Mayfield road, about twenty miles east of Bartles. It is situated in the barren lava, and in one of the warmest localities of the region,—and there are few cool spots in the lava anywhere. One enters the cave by crawling down a hole none too large. The instant the interior is reached the temperature falls in a surprising way. Not more than ten feet below the surface of the hot rocks is a bed of ice, covered by a foot or so of ice-water. The body of ice was perhaps twelve or fifteen feet long, by five feet across in the widest places. This cave is formed by a fissure that extends a distance of



THE SUMMIT OF GLASS MOUNTAIN.
From a photograph by M. S. Baker, August, 1898.



PITT RIVER CAÑON, SHASTA COUNTY.
From a photograph by M. S. Baker, July, 1895.



CINDER-CONE (OR CRATER), SISKIYOU COUNTY.

From a photograph by M. S. Baker, August 1898.



THE RECENT LAVA-FLOW FROM THE CRATER OF THE CINDER CONE.

From a photograph by M. S. Baker, August, 1898.

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twenty miles from the ice-cave to Pittville, and nearly coincides with the 4,000-foot level, as shown in the map. Along the southeastern half of this earth-fissure the southwest wall has faulted, leaving a cliff, which, in places, must be nearly 200 feet high.

For varied and awe-inspiring scenes, the Northeastern Sierra does not compare with the Central and Southern. Generally speaking, there is little beauty of scenery to be found except in favored localities. The ever-present forests of high conifers on the peaks almost entirely prevent the magnificent outlooks so common toward the south. The peaks are of only moderate height, and lack the rugged precipitousness of those about Tahoe, Yosemite, and Mt. Whitney. But the loss in scenery is partly compensated by the comfort in traveling (except over the lava-beds, which one may well pray to be delivered from), and by the almost endless shade of the cool forests.

FORESTRY NOTES.

Edited by Professor WILLIAM R. DUDLEY.

A new National Park was created by Act of Congress and the approval of the President, March 2, 1899. It is to be called *The Mount Rainier National Park*. It is eighteen miles square, with Mount Rainier for its center, and formerly was a part of the Pacific Forest Reserve, established February 20, 1893. This reserve, now known as the Mount Rainier Forest Reserve, was extended south to the Columbia in 1897, and is joined on the north by the Washington Forest Reserve. In the *Forester* for May, 1899, Bailey Willis, of the United States Geological Survey, gives a map and an extremely good account of this important new park, and advocates its extension in certain directions, to include forests, glaciers, and adjacent spurs that naturally belong to this park. It appears that two eminent Europeans, Professor Karl Zittel, the geologist, of Munich, and the Hon. James Bryce, who is a member of the English Alpine Club and an ardent mountaineer, wrote a joint letter in 1883, saying, "The combination of ice scenery with woodland scenery of the grandest type, is to be found nowhere in the Old World, unless it be in the Himalayas, and, so far as we know, nowhere else on the American Continent." They then expressed a hope that Congress would include the peak in a National Park.

Some twelve years or more passed, when "a memorial, prepared by a committee representing the American Association for the Advancement of Science, the Geological Society of America, the Sierra Club of California, and the Appalachian Mountain Club, was presented to the Senate by Senator Squire of Washington. In 1897, a bill based on this memorial, and designed to establish a National Park, passed both Houses of Congress, but failed of signature by the President." This bill, with slight modifications, was again introduced in 1899, and became a law. This park is placed under the control of the Secretary of the Interior, whose duty it is to police it and protect its woods, fish, and game. Mr. Willis says the main divide of the Cascades lies twelve miles east of Rainier's summit, and possesses a nearly even crest of 5,000 to 6,500 feet elevation. He suggests the construction of a road along this for fifty miles from the Northern Pacific Railroad south to the southern side of the park. "This splendid snow-peak would be seen rising from cañons far below this road to a height of 8,000

feet above it. That it is practicable to lay out this road there is no doubt, and that it will be found profitable, and will be built, is more than probable. It will challenge the world for its equal in variety and majesty of scenery."

The smallest of the California forest reserves received an accession of 50,000 acres through the proclamation of President McKinley dated January 30, 1899. This tract, known as the Trabuco Cañon Forest Reserve, now contains 99,920 acres. The original reservation was made February 25, 1893.

Under the date of February 10th, the Fish Lake Reserve,—a mountainous tract of 67,480 acres about Fish Lake and Fremont Valley, Utah, and south of the middle of the State,—was established by executive proclamation.

Under the same date, the Gallatin Forest Reserves, in Montana, were created. They consist of a series of even-numbered sections of mountain forest near Bozeman, within the watershed of the Gallatin River, and aggregate 40,320 acres. The alternate sections are railroad land.

On March 4th of the current year, the Gila River Forest Reserve was established. It is in New Mexico, and adjoins the Black Mesa Forest Reserve of Eastern Arizona. Its center seems to be the Mogollon Mountains, and it includes several of the sources of the Gila River, whose fertile lower valley is such an important part of Arizona. As this fertility, because of the aridity of climate, depends upon irrigation, the importance of the range of forest reserves recently created through central Arizona and New Mexico, cannot be easily overestimated.

In the telegraphic dispatches of April 14th, the President is reported to have set apart 136,000 acres, as the long-contemplated *Lake Tahoe Forest Reserve*. It covers something like nine townships in the mountain region southwest of Lake Tahoe, and has Pyramid Peak for its approximate center. As in all the forest reservations, lands on which entries have been made,—and there are many such near the western shore of Lake Tahoe,—are excepted from the reserve. Practically the entire forest belt of Government land in the Sierra Nevada Mountains, from Mount Breckenridge, east of Bakersfield, to the southwestern shore of Lake Tahoe, a distance of nearly 250 miles, is now reserved. This contains the sources of the Kern, the Tule, the Kaweah, the King's, the San Joaquin, Merced, Tuolumne, Stanislaus, Mokelumne, and American rivers, which rise among peaks from 10,000 to 14,000 feet elevation, and flow down into the great fertile but semi-arid plain known as the San Joaquin and Lower Sacramento valleys. To these abundant resources of irrigation might be added the many secondary and minor streams from the Fresno

and Calaveras rivers down to the foothill creeks, which could be counted on, if necessary, for storage water. This plain, averaging but a few hundred feet above sea-level, capable of producing all the stone fruits and small fruits, and in places the orange, lemon, and fig, is not less than 7,000,000 acres in extent, and is surrounded by great tracts of foothills suitable for olive and grape culture in the lower levels, and the pomaceous fruits at moderate elevations. Surrounding this plain, and from a few hundred to a few thousand feet above it, is the long-known, and still rich, mineral belt. In carefully considering other sections of our country, it does not appear that any other, of anything like this extent, presents such a favorable combination of natural advantages, or could support such a large number of people, if rightly cared for. A vast productive plain; a climate favorable to all the fruits of temperate and sub-tropical regions; proximity to a large bay and seaport; large mineral deposits; lofty mountains covered by coniferous forests, which, by care and renewal, can be made to yield a sufficient supply of fuel and lumber, and will afford protection to the abundant water supply, derived from the complete annual melting of a heavy snowfall; such are the conditions setting apart Central California as one of the most important natural districts in America to which the best results of science in forestry and the conservation of waters ought, at an early day, to be applied.

A consistent policy toward our forests in the semi-arid regions has for some years been apparent. Beginning with the recommendations of its Forestry Commission, and since the agitation of the question in 1897, it has clearly been the aim of the United States Government to reserve those mountain forests in California, Arizona, New Mexico, and Utah which protect the water supplies of the fertile valleys below. That is the significance of the belt of reservations almost encircling the orange-growing district in Southern California. That is also what the successive reservations in the Sierra, now nearly continuous from Breckenridge to Tallac, signify in relation to the great plain of Central California. The Sierra Forest Reserve, great as it is, is by no means complete. An extension of this to the Pitt River, Shasta, and the Upper Sacramento, or at least over so much of this region as shall include the head-waters and forests of the streams descending into the Sacramento Valley, is but the logical conclusion of this policy in relation to California. The BULLETIN has before advocated this; and a year ago the San Francisco Board of Trade petitioned the Government to establish a forest reservation about Lassen Butte.

Instead of applying the "German system" to our forests, or devising an "American system" out of hand, to be applied to the whole country, we must recognize that our country is so great, and includes such extremes of humidity, and totally different manifestations of temperature, that we must devise a California system of forestry, a Great Basin system (although the two will have much in common), and a Northwest Forest system, differing probably from the Alleghanian. Most certainly we must first recognize the fact that we have within our national borders an arid region, without excessive cold or destructive hurricanes, but where the lifelong dread of the tiller of the soil concerns a lack of water; another, a humid region, with abundant rainfall, where the excessive winter cold is most to be feared. In the first, our chief care must be to keep an unbroken forest cover over the mountain areas down to the lower limits of the winter snow; also to prevent over-pasturage. The question of lumber and fuel are secondary, that of revenue from the forests is incidental. In the second, because of abundant rainfall, of easy, natural renewal of the forested areas, and of cold, the questions of cheap and abundant fuel, of lumber, and of revenue from the same, become of first importance to the country; and the question of water supply (as for cities and mines), though important, is incidental. Both of these problems, curiously enough, occur within our own State. Yet Northwestern California, where the water-supply question is secondary, and the timber interests are highly important, will require a forest management different from any section of the Eastern United States. The forestry of the central Coast Range of California, and that of the mountains of the southeastern desert region are not pressing questions; but two great natural divisions of the State, each, economically, of the highest importance, each requiring special study and its own elaborate system of forest treatment, and of reservoirs, each made ready for such study by the nearly complete series of forest reservations, do require immediate attention. These are the great central valley and Southern California, both coming under the first class of problems mentioned. Localizing preliminary forestry study in this manner appears to be inevitable. The study of local conditions, interpreted scientifically, will result in the growth of individual systems adapted to sections where they have originated; and this method is bound to give the whole country a sound and economical forest management. As there are no richer areas in the drier regions of the United States than the two California districts, we invite the Government to send experts to them at once for the purpose of reporting a plan of forest management for Central California and Southern California, at an early date.

Meanwhile these timber reservations are to be protected from fires, timber thieves, and irresponsible shepherds another season by means of the "rangers." We desire to reaffirm our former words of commendation for the rangers appointed from the foothills or mountains they are to guard. They have the advantage of a complete knowledge of the mountain passes and trails, and they are usually among the most faithful of men. So far as observation went last fall, the late appointments were from this class, and consequently their work was well done. Our criticisms in the January BULLETIN applied only to the appointment—chiefly the earlier ones—of men who knew nothing of the mountains. This criticism—resorted to by a considerable number of journals—we regret, for it appears that the inefficient and ignorant men were replaced by better ones, as soon as practicable.

THE CALIFORNIA WATER AND FOREST SOCIETY.

The organization of the California Water and Forest Society, in January of this year, was due directly to the object-lesson given the industries of this State by the mountain fires and drought of 1898. The Miners' Association took the initiative, and through a special committee, called a meeting of those interested in the "conservation of the water and the preservation of the forests." Representatives of the mining, agricultural, horticultural, and commercial interests from all parts of the State met in San Francisco, and after discussing the objects of the meeting, adopted a permanent organization under the control of an executive committee, which will act under standing sub-committees. The foundation was thus laid of an organization which may be of incalculable benefit to the State. Its success will depend upon a large membership and an active executive committee.

Immediately after organization, some work was undertaken by the committee on legislation. This committee went to Sacramento in the hope of urging the Governor to recommend to the Legislature the passage of two measures,—one having as its object the co-operation by the State with the United States Geological Survey in reporting upon the places and methods for storing waters in the mountains, and the other asking that an unsalaried commission be created to report upon the forests of the State, and that a department of forestry be organized at once at the University of California to supply men prepared to carry out the suggestions of the commission. The bill relating to water-storage failed to reach the Governor in time for his signature; that relating to forestry did not reach final passage in the Legislature. The

organization of a forestry department in the University was not included in the proposed legislation, owing to objections raised by the Governor.

That this legislation failed is to be regretted. The State of Colorado has obtained a valuable and practical report by the United States Government upon her water supplies; the State of Wisconsin, through the agency of an unsalaried forestry commission, created by the Legislature in 1897, had her forests studied and reported on by a special agent of the Division of Forestry of the U. S. Department of Agriculture (Bulletin No. 16); the State of Oregon had a similar inspection and report made in 1897 of "Forest Growth and Sheep-Grazing" by an agent of the same department (Bulletin No. 15). The legislation proposed had in view similar results, to be obtained by enlisting the services of the Departments in Washington. But most to be envied is the State of New York, whose Legislature has established a college of forestry at Cornell University. Let us hope that the authorities of our universities will not overlook the ranking importance of the subject, and will follow Cornell's lead.

The scope of work of the California Water and Forest Society therefore is clearly defined, but its problems are many and difficult. More rational lumbering methods, protection of the forests from fire, the storage of the flood-waters, their proper distribution, are all questions that will require careful and continued investigation.

The society's first great duty will be to teach the people of the State the truth of the Arabian proverb, adopted as its motto, "The Tree is the Mother of the Fountain."

ELLIOTT MCALLISTER.

May 16, 1899.

NOTES.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

The office of the Sierra Club has been moved to Room 35, Merchants' Exchange Building, San Francisco, where all the maps, photographs and other records of the Club now are.

The maps of the Yosemite and San Joaquin Regions by J. N. Le Conte, may be had by members of the Club upon application and payment at the Cottage in the Yosemite Valley.

The attention of the members is again drawn to the few copies on file of No. 3, Volume I, of the BULLETIN. Those who have any extra copies of this number, will kindly send them at once to the Secretary.

SECRETARY'S REPORT.

FROM MAY 1, 1898, TO APRIL 30, 1899.)

The membership of the Club during the year 1898 to 1899 has remained about the same, the accessions being about equal to the losses resulting from resignations and non-payment of dues.

The Headquarters in Yosemite Valley have been continued this year, and they promise to be of great interest and value to the members of the Club and others visiting the valley.

The following have been elected Directors and officers for the year 1899-1900:—

MR. JOHN MUIR *President.*
 MR. ELLIOTT MCALLISTER . *Vice-President.*
 MR. J. N. LE CONTE *Treasurer.*
 PROF. W. R. DUDLEY . . . *Corresponding Secretary.*
 MR. ROBERT M. PRICE . . . *Recording Secretary.*

PRES. DAVID STARR JORDAN,
 MR. WARREN OLNEY,
 PROF. WALTER E. MAGEE,
 PROF. CLARENCE L. CORY.

COMMITTEE ON PARKS AND RESERVATIONS.

PRES. DAVID STARR JORDAN, *Chairman,*
 MR. WARREN OLNEY, PROF. JOSEPH LE CONTE,
 MR. ABBOT KINNEY, MR. CHARLES A. BAILEY.

The other standing committees of the Board will be reported to the members later on.

Amount of cash on hand May 1, 1898	\$ 29 45
Total collected for dues for the year	520 00
Received from sale of publications	40 35
Received on account Yosemite Headquarters	56 00
Total	<u>\$645 80</u>
Cash deposited to account of Treasurer	\$641 60
Balance cash on hand	4 20
Total	<u>\$645 80</u>

Respectfully submitted,

ROBERT M. PRICE,
Secretary.

REPORT OF TREASURER OF SIERRA CLUB.

MAY 1, 1898, TO APRIL 30, 1899.

RECEIPTS.

Balance from former Treasurer	\$ 49 59
Cash received from Secretary	641 60
Cash received — unexpended balance from Yosemite Headquarters	24 10
	<u>\$715 29</u>

EXPENDITURES.

Printing and mailing SIERRA CLUB BULLETIN	\$324 85
Printing circulars, etc.	17 25
Telegrams, and mailing circulars	10 60
Postage and sundry expenses of Secretary's office	7 04
Express charges for moving	6 00
Public meeting	11 50
Room rent — 17 months	140 00
Clerical service	62 00
Yosemite Headquarters	90 00
	<u>\$669 24</u>
Balance on hand	46 05
	<u>\$715 29</u>

C. B. BRADLEY,
Treasurer.

